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A REVISION OF THE NORTH AMERICAN SPECIES OF VERBENA[1]

LILY M. PERRY

Instructor in Botany, University of Georgia, Athens, Georgia
Formerly Rufus J. Lackland Research Fellow in Botany
in the Henry Shaw School of Botany of Washington University

INTRODUCTION

Verbena, the type-genus of the family Verbenaceae, is preeminently American. Owing to inherent variability and variations caused by adaptation to local conditions of growth, the group is a rather complex one. Moreover, since the last comprehensive monograph of the genus was published so long ago that it contains only some twenty of the hundred or more described North American species and varieties, considerable material has been incorrectly named. It appeared, therefore, that a critical examination of the group might be helpful in untangling the existing confusion of identities. The following paper is an attempt to present the results of a study of the North American species, together with a brief review of the historical, morphological, and phylogenetic aspects of the species under consideration.

The materials studied are indicated in the text by abbreviations for the herbaria to which they belong: the Academy of Natural Sciences of Philadelphia (ANSP); Field Museum of Natural History (F); Gray Herbarium of Harvard University (G); the Royal Botanic Gardens, Kew (K); the Missouri Botanical

[1] An investigation carried out at the Missouri Botanical Garden in the Graduate Laboratory of the Henry Shaw School of Botany of Washington University, and submitted as a thesis in partial fulfillment of the requirements for the degree of doctor of philosophy in the Henry Shaw School of Botany of Washington University.

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Garden (MBG); New York Botanical Garden (NY); Pomona College (P); United States National Herbarium (US); photographs of types and authentic specimens have been received from the Museum of Natural History, Paris (Par.); the Herbarium of the Botanical Garden and Museum, Berlin-Dahlem (Bot. Mus. Berl.-Dahl.), and the Herbarium of the Botanical Garden, Madrid (Herb. Bot. Gard. Madrid).

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TAXONOMIC HISTORY

The derivation of the word *Verbena* is obscure. The name has been handed down to us as representing certain herbs used in sacred rites by the ancients. Although apparently one of the well-known plants in botanical history, *Verbena* was described comprehensively for the first time by Tournefort,[1] whose description formed the basis of the synopsis of the genus as accepted by Linnaeus.[2]

In the 'Species Plantarum,' Linnaeus[3] records fourteen species of which eight have been removed since to other genera. The latter fact is sufficient to indicate that the Linnaean concept was too inclusive. It was held, however, until 1806, when Jussieu,[4] in an article on "Observationes sur la famille des plantes

[1] Tournefort, Institutiones Rei Herbariae, 200, *pl. 94*. 1700.
[2] Linnaeus, Gen. Pl. 12. 1754.
[3] Linnaeus, Sp. Pl. 18–21. 1753.
[4] Jussieu, Ann. Mus. Paris 7: 71–73. 1806.

Verbénacées," pointed out that the genus was a composite one containing several units. Amongst these he showed that *Verbena* differed from the others in having four stamens and four nutlets. This definition was accepted by Endlicher[5] under the heading "VERBENAE VERAE," and it has continued to the present time.

Although the genus is predominantly American, the earlier species were described largely from plants grown in various European gardens. This was unfortunate, since such types are often extinct or inaccessible or sometimes difficult to interpret on account of probable fusion or other modifications appearing in the species after some few years of cultivation. The first treatment of the North American species, as such, is that of Michaux.[6] He recognized eight species, all from the region of the middle and southeastern United States. From time to time new species were collected by pioneer explorers. Kunth[7] described eight from the Mexican region, Bentham[8] added three more, and Martens and Galeotti[9] reported eleven, of which six were new. The ablest and most inclusive work on the genus as a whole is that of Schauer.[10] In this he accepted seventy-one species and listed fourteen more as insufficiently known; of these, twenty-seven are indigenous to North America. Appearing about the same time as Schauer's work is that of Walpers,[11] whose review might be considered as an assembling of the literature of the genus rather than the results of a special monographic study; nevertheless, it is comprehensive and contains a few new species. Subsequently no publication of the North American species *in toto* has appeared, although the works of Gray[12] and Small[13] are very helpful in so far as regional floras are concerned. The last two publications contain the only keys to the group under consideration.

The type-species of the genus is *V. officinalis* L.

[5] Endlicher, Gen. Pl. 633 (no. 3685). 1838.
[6] Michaux, Fl. Bor.-Am. **2**: 13–15. 1803.
[7] HBK. Nov. Gen. et Sp. **2**: 272–277. 1818.
[8] Bentham, Pl. Hartw. 21. 1839.
[9] Martens & Galeotti, Bull. Acad. Brux. **11**[2]: 320–324. 1844.
[10] Schauer in DC. Prodr. **11**: 535–556. 1847.
[11] Walpers, Rep. **4**: 13–33. 1844–48; **6**: 686–687. 1846–47.
[12] Gray, Syn. Fl. N. Am. **2**[1]: 335–338. 1878.
[13] Small, Fl. Southeast. U. S. ed. 1, 1008–1011. 1903.

GROSS MORPHOLOGY

Roots.—Some species are annual with a fibrous root system branching from a slender primary root; others are perennial with a larger tap-root. They maintain themselves from year to year by crowns from which clustered new shoots rise near the base of the old ones. A few species show a tendency to root at the nodes. Probably, for the most part, the main purpose of these secondary roots is to aid in obtaining nourishment for the plant, as instance, *V. canadensis*, a hardy plant with stems rooting only at the lower nodes. Nevertheless, in *V. teucriifolia*, they may be a possible means of propagation, as definite roots are found at more or less remote nodes; occasionally, both roots and fruiting spike are developed from the same node. In many cases, it is difficult to tell whether a species is an annual or only a short-lived perennial. The question of duration depends in some measure on climatic factors.

Stems.—The stems are slender, terete, or, more commonly, quadrangular in cross-section with sharp or obtuse angles, and chiefly pubescent. Apparently all are herbaceous, the perennials dying down to the ground in winter and reappearing again in the spring. The shorter forms branch freely with decumbent-ascending or prostrate branches; the taller are usually erect with branches loosely ascending-spreading. All the lower branches are opposite, but the upper may be somewhat irregularly placed.

Leaves.—In the majority of the species of the section *Glandularia* the leaves are deeply cleft, whereas those of the *Verbenaca* are in large part merely dentate or incised. As a whole they are membranaceous, varying greatly in size and somewhat in thickness. In a few species they are strictly sessile; in most, however, they are either subsessile or short-petioled and tend to be strongly veined beneath. All have more or less short, sheathing, and connate bases. In general the leaves are opposite, but at times they are subalternate or irregularly disposed on the upper part of the stem; they are rarely ternate, and this arrangement appears to be an individual expression rather than a specific or even a varietal character.

Pubescence.—The trichomes are simple and unicellular, varying in quantity, length, rigidity, coarseness, and direction. None

of the pubescence is truly hispid, but in some species the hairs are slightly stiffer than in others; this indument, as exemplified in the calyx of *V. bipinnatifida*, is designated as "hispid-hirsute." In *V. prostrata* and *V. Gooddingii* the pubescence is characteristically soft-villous, but in the majority of species the general tendency is to approach a hispidulous-hirsute to strigillose condition. In the former instance, the trichomes, especially along the stem and on the inflorescence, are of different lengths and more or less spreading; whereas in the latter, as in *V. tampensis*, they are short, approximately equal, and appressed. Often the hairs of the upper surface of the leaf spring from minute bulbous bases; these, according to Solereder,[14] are calcified or silicified hairs, and the trichomes with somewhat pustulate bases, in *V. carolina* and occasionally in other species, are cystolith-hairs. In any case, Solereder did not find cystoliths dissociated from the hairs. A viscid condition is rarely present, but glandular hairs are widely distributed throughout the genus.

Inflorescence.—The inflorescence is terminal at the apices of stems or branches. The flowers are subtended by bracts and are borne in solitary or somewhat panicled or cymosely arranged spikes. Although these vary considerably, it is fairly easy to determine the section to which a plant belongs by the type of its spike.

In the majority of the indigenous North American species of the *Verbenaca*, the spikes are elongated and tend to be irregularly placed, as in *Verbena carolina*, so that they appear more or less panicled. In *V. sphaerocarpa* and *V. litoralis*, however, they are commonly arranged in simple or compound cymes. A spike may be either very slender with the flowers somewhat remote, or dense with imbricated flowers. In general, the elongated and comparatively narrow spike with small and inconspicuous flowers is a distinctive feature of the *Verbenaca* native to our continent.

On the other hand, the spikes characteristic of the section *Glandularia* are shorter and relatively broad with larger and more showy flowers. In the earlier stages of anthesis these are in fascicle-like clusters; later, when the rhachis elongates, the inflorescence becomes spicate.

[14] Solereder, Syst. Anat. Dicot. ed. 2, **1**: 631–633. 1908.

Calyx.—The calyx is tubular, 5-lobed or subtruncate, 5-nerved and persistent. The nerves protrude somewhat beyond the margin of the lobes, forming calyx-teeth; these vary more or less specifically and occasionally intraspecifically. The nerves are unequal in length and the posterior one, along which the calyx ruptures to release the schizocarp, is always the shortest. In the *Glandularia*, the calyx is at least twice as long as the schizocarp and at maturity the teeth and lobes are more or less contorted. In contrast, the calyx of the *Verbenaca* is generally shorter and may be either connivent, concealing the schizocarp as in *V. scabra*, or, as in such species as *V. urticifolia* and *V. officinalis*, open, disclosing the apices of the nutlets. With the developing ovary, the calyx enlarges a little at the base; usually it is somewhat angled, but in *V. tumidula* it is round at the base and tends to be inflated. Although only relative in value, the pubescence of the calyx is probably of more worth in specific determination than the other previously mentioned characters.

Corolla.—The corolla is salverform and various in color. The tube is either straight or incurved, as long as or much longer than the calyx, and uniform or slightly enlarged at the throat. The degree of the exsertion of the corolla-tube is apparently a convenient and obvious character, but one to be handled with care; first, it is somewhat variable, and second, when the corolla falls after anthesis, it does not drop at once but may be some little time working its way out of the calyx-tube; hence, the length of the exserted portion appears much greater than it really is. The limb is lobed and may be either conspicuous (6–12 mm. broad) or inconspicuous (2 mm. broad). The shape and the direction of the lobes may be of value in field identification but are not at all satisfactory in work on herbarium material. The throat inside is bearded with straight minutely roughened retrorse hairs and at the orifice with moniliform ones; outside and beyond the calyx it is either glabrous or finely pubescent. The inner hairiness is more prominent in the section *Glandularia*.

Stamens.—The stamens are didynamous, often very short-stalked, and in the North American species, inserted on the upper middle half of the corolla-tube, but not exserted. In *V. bipinnatifida* and all the related species of its section, the anterior pair

is very near the orifice of the throat and usually bears a gland-like appendage on the connective. The stamens are too much alike to be useful in specific differentiation.

Pistil.—The ovary is superior, bicarpellary, and entire or very shallowly lobed at the apex. The style varies in length with the length of the corolla-tube, bearing the mature stigma approximately in the region of the lower anthers. The typical form is slender and bilobed, the posterior lobe being sterile and laterally compressed, the anterior stigmatic and broad. The relation of these lobes to each other is reasonably constant throughout each section of the genus. In *V. scabra,* however, the broad stigmatic surface appears to be subtended on either side by a sterile style-lobe. Another interesting variation of the style is produced by *V. quadrangulata;* here, the base is enlarged or thickened into a somewhat hemispherical-angulate stylopodium and persists as an integral portion of the nutlets.

Fruit.—The fruit of *Verbena* is a schizocarp enveloped by the persistent calyx. As previously stated, the calyx splits along the posterior nerve to release the schizocarp attached to a more or less round-quadrangular gynobase. For the most part, four nutlets or pyrenae develop, two from each biovulate carpel. Generally the nutlets are either subcylindric or subtrigonous, but in *V. quadrangulata* they are beaked cylindric, and in *V. tumidula* subovoid. The dorsal surface is more or less convex with the lateral surfaces scarcely definite, rather appearing as continuations of the dorsal portion and adjoining the commissural face or faces. This is not always the case, since in *V. tumidula* the lower part of the nutlet seems inflated and the lateral is somewhat ventricose and smooth. The surface of the nutlet varies from essentially smooth, as in *V. carolina* and its allies, to striate or sulcate, and is oftenest raised-reticulate or reticulate-scrobiculate on the upper part. Occasionally, the character or scope of these depressions is of specific value, as in *V. gracilis;* but usually a certain type of nutlet is characteristic of a group of species rather than a single one.

The commissure may be more or less muricate or practically smooth. In the subcylindric pyrenae of the section *Glandularia,* the commissural face is commonly convex and does not extend

to the tip of the nutlet; whereas in the trigonous nutlets of the *Verbenaca*, the commissure ordinarily has two faces meeting at right angles, and is as long as the nutlet.

The gynobase varies with the size and shape of the pyrenae which it bears. In *V. carolina* and *V. Ehrenbergiana*, it is nearly flat and almost orbicular, but in species with larger nutlets, as in *V. simplex* and *V. neomexicana*, it is slightly deeper and in large part somewhat quadrangular. It shows its greatest development in the section *Glandularia* where the pyrenae are largest and often somewhat broadened at the base. Perhaps the gynobase should be used as a character complementary to that of the nutlets, but its definite value is rather elusive.

The more important morphological characters, which have been used in the delineation of the genus and its sections, are illustrated with a legend (pl. 13).

Hybrids.—It is a well-accepted fact that the cultivated races of *Verbena* have arisen through the more or less fusing of species attractive for horticultural purposes. Granting this, without field observation and knowledge gained through experimental work, the writer does not propose to discuss the question of hybridization in *Verbena*. Nevertheless, it is necessary to point out that there is a considerable number of specimens amongst the collections of this genus from the Middle States, which show variation in several directions or a combination of the characters of two or more species; it is the prevailing opinion that these plants are hybrids.

RELATIONSHIPS AND DISTRIBUTION

The genus *Verbena* is a member of the tribe *Verbeneae* according to Engler and Gilg,[15] or of the *Euverbeneae* according to Briquet in Engler and Prantl.[16] It is distinguished from its immediate relatives by the four dry and hardened nutlets. In this paper fifty-one species are recognized, four naturalized and forty-seven indigenous. With the exception of a few border-line species, it is relatively easy to separate the genus into two fairly distinct sections in which the majority of the members are so

[15] Engler & Gilg, Syllab. der Pflanzenf. eds. 9 & 10, 339. 1924.
[16] Engler & Prantl, Nat. Pflanzenf. 4^{3a}: 146. 1895.

different that it would seem as if they had followed divergent trends for a long period of time. In attempting to present any genus in a natural order, it is highly desirable to know what species are primitive. However, without an intimate knowledge of the more diversified South American species, it seems preferable to state the evidence derived from the study of the North American group and leave the conclusions vague rather than more or less arbitrary.

The section *Verbenaca* is probably the older of the two. It has the wider distribution, ranging from Canada to Panama as well as from the east to the west coast of United States and Mexico. Also, it is larger, containing thirty-two species. A number of these are annual, the remainder are perennial, but it is often hard to distinguish the members by this criterion. Although admittedly varying and apparently intergrading, the species as a whole are more stable and more readily recognized than those of the section *Glandularia*. The flowers are much smaller and for the most part are produced in greater abundance; the nutlets also are abundant and in some cases minute. The combination of these characters leads one to conclude that this section is the more primitive one.

Within the section, some species appear to be more closely related than others. *V. officinalis*, *V. menthaefolia*, *V. Halei*, and *V. riparia* form a natural group possessing the same general habit, type of pubescence and of nutlets. These are species of more or less adjacent regions except *V. officinalis*, which has been introduced from Europe. Again, *V. Ehrenbergiana*, *V. carolina*, *V. longifolia*, and *V. recta* are very closely related, with *V. urticifolia* and *V. scabra* only a little farther removed. The last five species differ from the first mentioned in their more or less upright habit and less divided leaves, also in their smaller and somewhat smoother nutlets. It would appear as if all had arisen very close to the ancestral form and diverged only a little in the process of adaptation to environment.

V. hastata and *V. simplex* are quite distinctive in habit, but the abundance of intermediate forms occurring between these and the two species, *V. stricta* and *V. bracteata*, would seem to indicate a close relationship amongst these units. *V. Orcuttiana*, although

somewhat isolated, appears to have its nearest affinity in *V. simplex*.

A third closely related group contains *V. canescens*, *V. neomexicana*, *V. plicata*, and *V. gracilis;* the common characters here are those of leaf-incision, pubescence, and general features of inflorescence. *V. perennis* resembles this group in all respects except in its quite aberrant pubescence of short antrorse and hispidulous trichomes; in this character it simulates more closely the first-mentioned group.

The following are more or less isolated species of limited distribution and with fairly static characters: *V. xutha*, *V. prostrata*, and *V. robusta*. *V. carnea* is probably a relic of some ancient form; the distinctive character of the schizocarp gives no clue to its affinities, but rather emphasizes the anomaly of the species.

The section *Glandularia* seems to be the more nascent. The species are perennial, developing from a crown, and have a more or less sprawling to upright habit. The characters are highly variable and some species are difficult to distinguish, apparently passing into each other. Particularly is this true of *V. ambrosifolia*, *V. Wrightii*, and *V. ciliata*. Some of the specimens from northern Mexico have been most perplexing; while it is perfectly evident that they belong to this group, none of them is typical. *V. bipinnatifida* is a closely related and wide-ranging species; by comparison, its characters are fairly clear-cut. The remaining species of the section are easily associated in groups or are anomalous. *V. canadensis*, *V. maritima*, and *V. tampensis* are very much alike either in habit or in floral structure. *V. tampensis*, however, is one of the species of this group where the glands may or may not be present on the anthers, and may represent the development of some transitional stage between the two sections. *V. elegans* of Mexico is very closely parallel to *V. canadensis* of the southeastern and central United States. *V. delticola* seems to belong in this association also; yet it is interesting to note that its fruit shows a tendency to develop a beak, and this may be significant of some little affinity with *V. quadrangulata*, a species so aberrant that it has been treated as a separate genus. *V. Gooddingii*, *V. tumidula*, and *V. pumila*

might very well be related to any of the previously mentioned species of the section. *V. setacea* resembles *V. Gooddingii* var. *nepetifolia* in habit, but it has such long calyx-teeth that one is a little hesitant about expressing any ideas of its relationship. *V. teucriifolia* and *V. ciliata* appear to intergrade in Mexico. The former, as well as *V. pumila*, shows a tendency toward reduced corollas and perhaps parallel development. *V. lilacina* and *V. amoena* are without close relatives.

Considering the genus as a whole, some species are in a state of flux showing many atypical forms and covering fairly large geographic areas; others are just as widespread and yet are characterized by more static characters; and again, others are endemic showing a very limited distribution and appearing as outlying members of the group. The species probably vary from youth to age in the order mentioned.

As previously stated, the genus *Verbena* is fairly widely distributed in North America; its range extends from southern Canada to Panama and from the east coast to the west both in United States and in Mexico. It is found also in the West Indies and on islands in the Pacific off the coasts of California and Mexico. It occurs in great abundance in Texas, New Mexico, and Arizona, south along the Sierra Madre and throughout the eastern part of Mexico. It is also fairly well distributed in southern Mexico, but only a few species are reported from Central America. The region of greatest specific concentration for North America is in the state of Texas, where twenty out of the forty-seven indigenous North American species are represented. Amongst these species are members of both sections, some with very definitely clear-cut characters and more or less limited distribution, others with fluctuating characters and more widely distributed.

By way of contrast, let us consider the outlying members of the genus which have stable characters and are isolated or inhabit very limited areas—*V. lilacina, V. sphaerocarpa, V. Orcuttiana, V. setacea, V. macrodonta, V. amoena*, and *V. subuligera;* or again species such as *V. carnea* and *V. quadrangulata*, which are singular but have a larger geographic range. All these appear to be relics of a more ancient distribution. Undoubtedly

V. lilacina and *V. sphaerocarpa*, endemics of Cedros and Socorro Islands respectively, developed as a result of geographic isolation. The same may be true of the Lower Californian entities, *V. macrodonta*, *V. setacea*, and *V. Orcuttiana*. Perhaps *V. amoena* from Lecheria, a locality some little distance north of the city of Mexico, and *V. subuligera*, from the Sierra Madre west of Durango, owe both their restriction and their differentiation to the presence of mountainous barriers. However, the same conclusion is hardly valid for either *V. carnea*, ranging from North Carolina to Florida and west to Texas, or *V. quadrangulata*, of southern Texas and Tamaulipas; yet they are probably relic endemics which have survived in favoring areas. If this be true, here is another bit of interesting evidence supporting the idea that the *Verbenaca* is the older of the two sections. Of the nine species enumerated above as being of more ancient derivation, four, *V. setacea*, *V. lilacina*, *V. amoena*, and *V. quadrangulata*, have been placed in the section *Glandularia;* yet, in the flowers examined, the anthers are definitely unappendaged. To be sure, this disposition of the species is not in accord with the previous classifications and may not be acceptable; nevertheless, it seems logical to believe there must be transitional forms in the development and evolution of species; and in this case, the major portion of the characters of the species in question are those of the section *Glandularia*. Two other species which have developed a little farther along this same line are *V. tampensis* and *V. pumila;* gland-like appendages may or may not be present on the anthers; if present, they are usually very small.

It may be of interest to note that, in agreement with Jordan's law of distribution, the species associated in groups usually occupy adjacent regions.

Now as to origin.—It is possible that the progenitors of *Verbena* were very widespread at the beginning of the Pleistocene and with the glacial advance migrated southward; later, when more favorable climatic conditions developed they spread northward, establishing themselves in the present regions of distribution. Another possibility is that the centre of distribution is in South America and migration has been northward. However this may be, *V. litoralis* is the only known species indigenous to both

countries and does not seem to be very closely related to the remaining North American species. Without a detailed investigation of the South American group, it seems preferable to reserve assumptions in the matter.

Economic Value

Verbena is of very little value economically. It was introduced into cultivation in European gardens relatively early in the history of botanical explorations. Although not so popular as it was once, on account of its vigor and hardiness, it is still used in many gardens to impart bright colors to the landscape.

Taxonomy

Verbena [Tourn.] Linn. Gen. Pl. 12. 1754.
Obletia Rozier, Jour. Phys. **1**: 367, *pl. 2*. 1773.
Glandularia Gmel. Syst. Veg. 920. 1791.
Billardiera Moench, Meth. 369. 1794.
Shuttleworthia Meisn. Pl. Vasc. Gen. 290. 1839, and Comm. 198. 1839.
Uwarowia Bunge, Acad. St. Petersb. Bull. Sci. **7**: 278. 1840.

Calyx tubular, 5-toothed, 5-nerved, at maturity often slightly enlarged at the base, persistent. Corolla minute to conspicuous, hypocraterimorphous, subbilabiate, 5-lobed; tube erect or incurved, uniform or slightly enlarged above, equalling the calyx-lobes or surpassing them; lobes imbricate in the bud, broadly oblong, obtuse or retuse, unequal. Stamens 4, didynamous, included; anthers ovate, unappendaged or the connective of the upper pair expanding extrorsely into a clavate and gland-like appendage; filaments usually short, attached above the base of the corolla-tube. Ovary superior, entire at apex or very shortly 4-lobed, bicarpellary, 4-loculed; ovules in pairs, one to each locule, anatropous; style terminal, mostly bilobed, the anterior lobe stigmatose and the posterior usually sterile. Schizocarp included in the persistent calyx, dry, hardened or brittle, separating into 4 homomorphous nutlets. Seed erect; embryo straight; endosperm none.—Chiefly American. Herbs or shrubs, erect or decumbent to prostrate, pubescent or occasionally glabrous. Leaves opposite, rarely ternate or verticillate, or the upper

alternate (irregular), variously dentate, incised or dissected, not often entire. Spikes terminal, rarely axillary, peduncled or sessile, densely flowered or elongate and slender with flowers remote, solitary, cymose or paniculate. Flowers hermaphroditic, zygomorphic, sessile and bracteate.

SECTION 1. VERBENACA Schauer

1. VERBENACA Schauer in DC. Prodr. **11**: 536. 1847.

Sterile style-lobe adjacent to the stigmatic surface or sublateral but usually not protruding beyond it; ovary entire at the apex with the style attached at the distal end, or, if at all lobed, style inserted in the indefinite depression between the lobes; schizocarp commonly not constricted along the lines of cleavage; anthers unappendaged. Annuals or herbaceous perennials with prostrate, decumbent-ascending or erect stems. Flowers mostly not showy. Calyx rarely more than twice as long as the schizocarp and not contorted beyond it. Species 1–32.

Ser. I. PACHYSTACHYAE Schauer. Heads or spikes, at least in anthesis, crowded and short, not at any time greatly elongated or open, generally disposed in compound cymes.—Chiefly introduced South American species.

KEY TO THE SPECIES

A. Leaves semiamplexicaul and subcordate.
  B. Inflorescence glandular; bracts conspicuously longer than the calyx; corolla-tube 2–3 times as long as the calyx. . . . . *1. V. rigida*
  B. Inflorescence not glandular; bracts barely equalling or only slightly exceeding the calyx; corolla-tube scarcely twice as long as the calyx. . . . . *2. V. bonariensis*
A. Leaves not semiamplexicaul nor subcordate, tapering into a cuneate-attenuate subsessile or petiolar base.
  C. Spikes short (3–5 mm. long), very dense and appressed-pubescent.
    D. Fruiting-calyx ascending; schizocarp longer than broad, raised-reticulate above, striate toward the base. . . . . *3. V. brasiliensis*
    D. Fruiting-calyx spreading; schizocarp as broad as long, practically smooth. . . . . *4. V. sphaerocarpa*
  C. Spikes 5–10 mm. long, dense at the apex, somewhat open below and finely strigillose. . . . . *5. V. litoralis*

1. V. rigida Spreng. in L. Syst., Cur. Post. **4**[2]: 230. 1827.
V. venosa Gill. & Hook. Bot. Misc. **1**: 167. 1830.

V. bonariensis var. *rigida* O. Kuntze, Rev. Gen. 3²: 255. 1898; Briq. Ann. Conserv. & Jard. Bot. Genève 7–8: 291. 1904.

Stems 2–6 dm. tall, sharply 4-angled in cross-section, scabrous-pubescent; leaves oblong to oblong-lanceolate or narrowly obovate, sessile, more or less semiamplexicaul, subcordate, sharply and coarsely serrate, midrib and veins impressed above but prominently reticulated beneath, scabrous and more or less hispidulous on both surfaces, margins of older leaves somewhat revolute; spikes usually short, dense and cylindrical, disposed in subternate cymes with the laterals pedunculate; bracts lanceolate, acuminate-subulate, usually closely imbricated and longer than the calyx, glandular-pubescent, ciliate; calyx 4 mm. long, glandular-pubescent, lobes acute with short mucronate-subulate tips; corolla-tube twice (–thrice) as long as the calyx, pubescent without; corolla-limb 5–7 mm. broad; stamens inserted on the lower middle of the corolla; nutlets trigonous, slightly broader at the base than at the apex, scarcely 2 mm. long, raised-reticulate on the upper half, striate toward the base; commissural faces muricately scabrous.

Distribution: indigenous to South America; introduced in the West Indies and southern United States.

Specimens examined:

North Carolina: roadside, Williamston, Martin Co., 4 July 1922, *Randolph 688* (G).

Georgia: uncultivated ground, in perennial spreading patches, 26 May 1928, *Reade* (NY); vicinity of Thomson, McDuffie Co., 1 Sept. 1907, *Bartlett 1122* (P).

Alabama: Mobile, *Mohr* (US); Mobile, June 1919, *Graves 525* (MBG, US).

Louisiana: Mandeville, 15 Aug. 1912, *Pennell 4204* (NY); Covington, Aug. 1919, *Arsène* (US); Catalpa, 24 Aug. 1912, *Pennell 4332* (NY); Baton Rouge, 28 March 1904, *Billings 49* (G); roadsides, Plaquemines Co., July 1883, *Langlois* (NY).

Texas: Orange, 1914, *Young 662* (P, US); Huntsville, 24 May 1917, *E. J. Palmer 12038* (MBG); Houston, 1872, *Hall 433* (G, MBG, NY, P, US); Houston, 1913, *Fisher 460, 625* (US); Houston, 25 Sept. 1915, *Thurow* (US); Houston, 22 May 1917, *E. J. Palmer 12001* (MBG); 16 km. southeast of Houston, 12 April 1925, *Small & Wherry 11813* (NY).

Mexico: Vera Cruz: Zacuapan, May 1913, *Purpus 6413* (F, G, MBG, NY, US).

West Indies:

Bermuda: St. George's, 13 July 1905, *Moore 2984* (G); near Devil's Hole, 13 June 1905, *Harshberger* (ANSP, G, MBG); near Hamilton, 31 Aug.–21 Sept. 1905, *Brown & Britton 153* (ANSP); Tucker's Town, 3 May 1912, *Collins 45* (G); Tucker's Town, 8 Aug. 1913, *Collins 269* (G, NY); fields, Montrose, Sept. 1913, *Brown, Britton & Wortley 1645* (ANSP, NY); St. David's Island, 22 May–2 June 1919, *Brown 693* (ANSP, NY).

CUBA: near Farallones, Oriente, 5 Aug. 1913, *Leon 3910* (NY).

JAMAICA: road to Salt Hill, St. Andrew, 6 May 1915, *Harris 11969* (G, MBG, NY); Blue Mountains, St. Andrew, 20 March 1916, *Perkins 1024* (G); near Fairfield, 3–7 Sept. 1908, *Britton 3176* (NY).

GUADELOUPE: without locality, 1893, *Duss 3470* (NY).

MARTINIQUE: without locality, Sept. 1901, *Duss 4697* (NY).

This South American species is commonly cultivated. It has escaped and established itself in various places. Kuntze and Briquet have regarded it as a variety of *V. bonariensis*, but lacking a considerable amount of material for examination, the writer prefers, at present, to maintain it as a specific entity.

2. V. bonariensis L. Sp. Pl. 20. 1753.

V. elongata Salisb. Prodr. 71. 1796.

?V. quadrangularis Vellozo, Fl. Flum. 16. 1825; **1**: *pl. 39*. 1827.

Stems 1 m. more or less in height, 4-angled in cross-section, somewhat scabrous-pubescent; leaves decussately opposite, lanceolate, subauriculate, semiamplexicaul, acutely serrate, entire toward the base, rugose and hirtellous above, spreading-pubescent beneath, particularly along the prominently reticulated veins; spikes compact, mostly short, commonly sessile and crowded in dense fasciculate cymes; bracts lanceolate-acuminate, barely equalling or slightly exceeding the calyx, pubescent; calyx 3 mm. long, pubescent, lobes acute with short subulate tips; corolla-tube scarcely twice the length of the calyx, pubescent without; corolla-limb inconspicuous; nutlets 2 mm. long, trigonous, chiefly striate, slightly raised-reticulate at apex; commissural faces scarcely reaching the tip of the nutlet, muricate-scabrous.

Distribution: native of South America; introduced into southern United States and the West Indies.

Specimens examined:

SOUTH CAROLINA: roadsides near Charleston, *Curtiss 1963* in part (F, G, MBG, NY); Charleston Neck, 28 Sept. 1853, *Gibbes* (NY, US); Charleston, 30 April 1912, *Robinson 127* (G); about 6 km. south of Charleston, 9 Nov. 1929, *Moldenke 148* (MBG, NY).

GEORGIA: along canal bank, Augusta, *Cuthbert 267, 358* (NY).

LOUISIANA: vicinity of Covington, 1920, *Arsène 11859, 12534* (F, US).

ARKANSAS: roadsides near Forrest City, 17 Oct. 1925, *E. J. Palmer 29303* (G, MBG, NY).

TEXAS: Huntington, 15 Sept. 1923, *Tharp 2558* (US).

WEST INDIES:

BERMUDA: waste ground, 29 March–3 May 1909, *Marble 737* (ANSP, NY); Pem-

broke Swamp, 21 June 1905, *Harshberger* (ANSP, G, MBG, NY); roadside, Pembroke, 31 Aug.–20 Sept. 1905, *Brown & Britton 98* (ANSP, G, NY, P); Hamilton, 12 July 1905, *Moore 2946* (G); Hamilton, 16 Jan. 1912, *Robinson 94* (G); Tucker's Town, *Collins 53* (G), *266* (G, NY).

JAMAICA: Blue Mountains, 14 Jan. 1890, *Hitchcock* (MBG); Blue Mountains, Mt. Hybla, 5 Apr. 1916, *Perkins 102* (G); St. Helen's Gap, 7 April 1909, *Taylor 4244* (NY); St. Helen's Gap, St. Andrew, 4 March 1920, *Maxon & Killip 569* (G, NY); Cinchona, 26 July 1903, *Nichols 163* (G, MBG, NY); Cinchona, 22 Dec. 1905, *Harris 9132* (NY); Arntully, 25 Aug. 1927, *Orcutt 2736* (G, MBG).

This is another introduced South American species evidently related to *V. rigida*, but it is a larger and coarser plant with smaller flowers as well as less harsh and somewhat viscid pubescence.

3. V. brasiliensis Vellozo, Fl. Flum. 17. 1825; **1**: *pl. 40.* 1827.

V. litoralis var. *brasiliensis* Briq. Ann. Conserv. & Jard. Bot. Genève **7–8**: 292. 1904.

Stems 1 m. more or less in height, 4-angled in cross-section, practically glabrous below, somewhat scabrous-pubescent above, slightly contracted at the nodes; leaves decussate, lanceolate, tapering into a cuneate-attenuate, subsessile or petiolar base, sharply or incised serrate, strigillose and somewhat pustulate above with veins impressed, sparsely pubescent beneath; spikes compact, mostly short and strict, usually sessile in open cymes; bracts scarcely as long as the calyx, lanceolate, subulate at apex, ciliate; calyx approximately 3 mm. long, somewhat appressed-pubescent, lobes acute with short subulate tips; corolla-tube a little longer than the calyx, pubescent without; corolla-limb inconspicuous; nutlets trigonous, about 2 mm. long, strongly striate, raised-reticulate at apex; commissural faces scarcely reaching the tip of the nutlet, muricate-scabrous.

Distribution: South America; introduced into southern United States.

Specimens examined:

NORTH CAROLINA: ballast dumps at Wilmington, 2 July 1897, *Small 5707* (G, MBG, NY); dry sandy soil, open woods about 3 km. south of Wilmington, 25 July 1922, *Randolph 1004* (G).

GEORGIA: savanna, 27 May 1927, *Korthoff* (US); Brunswick, 12 May 1930, *Moldenke 1184* (MBG, NY).

FLORIDA: waste place, Chipley, 24 May 1930, *Blanton 6598* (MBG, US); waste ground, Pensacola, 24 July 1899, *Curtiss 6490* (G, MBG, NY, US); ballast ground, Pensacola, 30 April 1903, *Tracy 8706* (F, G, MBG, NY, US).

ALABAMA: ballast ground, estuary of Mobile River, 4 July 1893, *Mohr* (US); Port

Eads, 22 Aug. 1900, *Lloyd & Tracy 20* (F, G, MBG, NY, US); north bank, Bayou Terrebonne, Houma, 29 May 1914, *Wurzlow* (NY).

A species very similar in habit to *V. litoralis* but readily distinguished by the difference in inflorescence. The spikes of *V. brasiliensis* are short, compact, sessile, and regularly arranged in open cymes; whereas those of *V. litoralis* are longer, compact or somewhat elongate, peduncled, and arranged in more or less paniculate cymes.

4. V. sphaerocarpa Perry,[17] n. sp.

Stems erect, square in cross-section, branched above, glabrous or sparsely scabrous-pubescent; leaves oblong, tapering at the base into a short petiole, 3–6(–10) cm. long, acute, sharply serrate, the upper often entire, scabrous-pubescent above with trichomes minutely bulbous at the bases, more or less short-strigillose on both surfaces, prominently veined beneath; spikes short and dense, subsessile or short-pedunculate, cymosely arranged; bracts ovate-lanceolate, shorter than the calyx, acute, pubescent; calyx scarcely 2 mm. long, connivent over the schizocarp, appressed-pubescent, teeth very short, acutish; corolla-tube protruding slightly beyond the calyx; corolla-limb about 1.5–2 mm. broad; schizocarp 1 mm. long, approximately 1 mm. in diameter; nutlets very faintly striate or essentially smooth; commissural faces muriculately scabrous.

Distribution: known only from Socorro Island.

Specimens examined:

MEXICO: COLIMA: Socorro Island: March–June 1897, *Anthony 380* (G, MBG TYPE, US); 27 May–3 July 1903, *Barkelew 231* (G, MBG, P, US); 9 May 1925, *Solis 70* (US).

This endemic from Socorro Island is most nearly related to *V.*

[17] **V. sphaerocarpa** Perry, sp. nov., annua vel perennis (basi ignota); caule erecto quadrangulari glabro vel sparse scabro-pubescente; foliis oblongis basi in brevem petiolum attenuatis 3–6(–10) cm. longis acutis, infimis argute serratis, superioribus saepe integris, omnibus scabro-pubescentibus supra subtusque plus minusve breviter strigosis et reticulatis; spicis brevibus et compactis subsessilibus vel breviter pedunculatis in cymas dispositis; bracteis ovato-lanceolatis acutis pubescentibus calyce brevioribus; calyce vix 2 mm. longo connivente adpresso-pubescente; calycis dentibus brevissimis acutiusculis; corollae tubo paulo exserto; corollae limbo circiter 1.5–2 mm. lato; schizocarpio 1 mm. alto circiter 1 mm. lato; coccis obsolete striato-reticulatis.—Collected on Socorro Island, Mexico, March–June 1897, *Anthony 380* (MBG), TYPE.

litoralis and has a similar habit, but is easily separated on the distinctive characters of the inflorescence. The spikes are shorter and denser, the flowers are smaller and so crowded that the lower ones appear to be inserted at right angles to the rhachis of the spike; moreover, the schizocarp is fully as broad as or even broader than long, an unusual trait not found elsewhere in the North American species of *Verbena*.

5. V. litoralis HBK. Nov. Gen. et Sp. **2**: 276, *pl. 137*. 1818.
V. caracasana HBK. *l. c.* 275.
V. bonariensis var. *littoralis* Hook. Bot. Misc. **1**: 166. 1830.
V. affinis Mart. & Gal. Bull. Acad. Brux. **11**²: 322. 1844.
V. littoralis α *pycnostachya* Schauer in DC. Prodr. **11**: 542. 1847, excluding *V. brasiliensis* Vell. Fl. Flum. **1**: *pl. 40*.
V. littoralis β *leptostachya* Schauer in DC. Prodr. *l. c.*
V. Hanseni Greene, Pittonia **3**: 308. 1898.
V. litoralis var. *caracasana* Briq. Ann. Conserv. & Jard. Bot. Genève **7–8**: 292. 1904.

Stems approaching 1 m. in height, square in cross-section, somewhat fastigiately branched above, glabrous or sparsely strigillose, slightly contracted at the nodes; leaves lanceolate or oblong, tapering into a very short petiole or a subsessile base, 3–10 cm. long, decussate, more or less sharply and coarsely serrate, sparsely strigillose on both surfaces, scabrous and somewhat rugose above, prominently veined beneath; spikes terminal, fairly dense, pedunculate, cymosely arranged or tending to be panicled, often elongate; bracts ovate-lanceolate, acuminate, subequalling or somewhat shorter than the calyx, glabrate; calyx 2–2.5 mm. long, finely strigillose, subtruncate, teeth minute, subulate; corolla-tube variable in length, always somewhat longer than the calyx; corolla-limb inconspicuous, 2.5–3 mm. broad; nutlets trigonous, hardly 2 mm. long, striate, somewhat reticulate at the apex; commissural faces about as long as the nutlet, muricate-scabrous.

Distribution: Mexico, Central and South America; introduced into the United States.

Specimens examined:
LOUISIANA: north bank, Bayou Black, Houma, 5 and 9 May 1914, *Wurzlow* (NY).
CALIFORNIA: Clinton, Amador Co., June 1896, *Hansen 2025* (MBG).

MEXICO:

SAN LUIS POTOSI: on mountains around the city, San Luis Potosi, 1876, *Schaffner 718* (G); Alvarez, 28 Sept.–3 Oct. 1902, *Palmer 141* in part (G).

NAYARIT: Tepic, 5 Jan.–6 Feb. 1882, *Palmer 2019* (US), *2014a* (G, NY).

JALISCO: fields, Guadalajara, 11 Aug. 1902, *Pringle 11093* (F, G, MBG, NY, US).

HIDALGO: near Ixmiquilpan, 1905, *Rose, Painter & Rose 9077, 9151* (US).

VERA CRUZ: Orizaba, 27 July 1891, *Seaton 27* (F, G, NY, US); Huatusco, April 1857, *Mohr* (US); Fortin, Feb. 1883, *Kerber 311* (US); Santa Rosa, 13 Aug. 1926, *Fisher 168* (US).

TABASCO: Mayito, 10 April 1889, *Rovirosa* (ANSP, NY, US).

PUEBLA: Pahuatlan, 14 June 1913, *Salazar* (US); near Puebla, 20 Oct. 1908, *Arsène* (US).

MICHOACAN: low valley, Zinapecuaro, 2 May 1849, *Gregg 764* (MBG); Quinceo, 11 Nov. 1909, *Arsène* (US); Morelia, Aug.–April 1840, *Galeotti 781* (K), TYPE collection of *V. affinis;* Morelia, Coronilla, 8 Aug. 1909, *Arsène* (US).

OAXACA: wet meadows, Sierra de San Felipe, 11 Sept. 1894, *Pringle 4877* (ANSP, G, MBG, NY, P, US); Sierra de San Felipe, 6 Oct. 1894, *C. L. Smith 222* (MBG, US); San Jacinto, 25 Sept. 1895, *L. C. Smith 794* (G).

CENTRAL AMERICA:

GUATEMALA: uncultivated places, Oct. 1885, *Bernoulli 128* (NY); without locality, 1892, *Heyde 610* (US); waste places near railway bridge, 5 June 1909, *Deam 6180* (G, US); vicinity of Los Amates, Dept. Izabal, 24 May 1922, *Standley 24404* (US); Coban, Dept. Alta Verapaz, May 1886, *von Tuerckheim 904* (ANSP, F, G, NY, US); near the Finca Sepacuite, Dept. Alta Verapaz, 25 March 1902, *Cook & Griggs 148* (US); Canjutz, Dept. San Marcos, 1 Sept. 1922, *Salas 32* (US); Guatemala, 1923, *Ruano 332, 403* (US); Guatemala City, 1912, *Aguirre 4* (US); near Guatemala, July 1921, *Tonduz 627* (US); Chiapas, Dept. Santa Rosa, Dec. 1892, *Heyde & Lux 4370* (G, NY, US); Santa Rosa, May 1892, *Heyde & Lux 3019* in part (G).

HONDURAS: vicinity of Siguatepeque, Dept. Comayagua, *Standley 56082* (F, US).

SAN SALVADOR: vicinity of Ateos, Dept. La Libertad, 17 April 1922, *Standley 23326* (G, US); Volcan de San Vicente, Dept. San Vicente, 7–8 March 1922, *Standley 21486* (G, NY, US); Cerro de San Jacinto, near San Salvador, 8 Feb. 1922, *Standley 20617* (G, US); San Jacinto, 5 April 1905, *Velasco 8848* (G, US); Volcan de San Salvador, 7 April 1922, *Standley 22842* (US); vicinity of San Salvador, 1905, *Renson 291* (NY, US); San Salvador, 1922, *Calderon 729* (G, NY, US), *925* (G, US).

NICARAGUA: Casa Colorada and vicinity, south of Managua, 27 June 1923, *Maxon, Harvey & Valentine 7356* (NY, US); Las Nubes and vicinity, south of Managua, 28 June 1923, *Maxon, Harvey & Valentine 7478* (US).

COSTA RICA: without locality, 19 June 1874, *Kuntze 2109* (NY, US); without locality, April 1910, *Worthen* (MBG); Los Ayotes, near Tilaran, Prov. Guanacaste, 21 Jan. 1926, *Standley & Valerio 45430* (US); Aguacate, Nov. 1846, *Oersted 11322* (US); vicinity of San Jose, Feb. 1924, *Standley 33293* (US); vicinity of La Palma, on the road to La Hondura, 17–18 July 1923, *Maxon & Harvey 7951* (US); Cerro de Piedra Blanca, above Escasu, 31 Jan. 1924, *Standley 32652* (US); near Cartago, 1845–8, *Oersted 11324* (US); Cartago, Oct. 1887, *Cooper 5890* (F, G, MBG, NY, US).

PANAMA: fields along Rio Caldera above El Boquete, 5 Feb. 1918, *Killip 3510* (US).

This is a widely distributed species with very distinctive habit and somewhat variable inflorescence. In some specimens the

spikes appear to remain compact, in others they tend to elongate. Schauer used this difference to separate the forms *pycnostachya* and *leptostachya*, although he frankly admits the difficulty of distinguishing the two owing to the intermediate phases. *V. affinis* is characterized by a somewhat coarser floral pubescence; this, however, seems to be a variable feature and, as such, does not appear to merit more than passing mention.

Ser. II. LEPTOSTACHYAE Schauer. Spikes slender and open or compact at anthesis, greatly elongating in fruit, solitary or in simple cymes or panicled.—North America.

KEY TO THE SPECIES

A. Spikes panicled at the apices of stems and branches, subtended chiefly by inconspicuous bracts; floral bracts not prominent.
  B. Spikes very slender, elongated and graceful, usually with remote fruits.
    C. Leaves 1–2-pinnatifid or 3–5-cleft or deeply incised.
      D. Corolla-limb not less than 3 mm. broad; nutlets 1.5 mm. or more long.
        E. Schizocarp a little longer than broad.
          F. Inflorescence usually densely glandular and somewhat viscid-pubescent.....*6. V. officinalis*
          F. Inflorescence sparsely, if at all, glandular and strigillose.....*7. V. menthaefolia*
        E. Schizocarp about twice as long as broad.
          G. Leaf-blades diverse in outline, the basal incised-dentate, the middle stem-leaves 1–2-pinnatifid, the upper sparingly toothed or entire; bracts one-half as long as the calyces at anthesis.....*8. V. Halei*
          G. Leaf-blades similar in outline; bracts about as long as the calyces at anthesis.....*9. V. riparia*
      D. Corolla-limb scarcely more than 1 mm. broad; nutlets 1.5 mm. or less long.....*10. V. Ehrenbergiana*
    C. Leaves serrate or shallowly incised.
      H. Leaves subsessile or short-petioled with attenuate base.
        I. Stems hirsute-hispid; leaves mostly crenate-serrate; calyx hispidulous.....*11. V. carolina*
        I. Stems glabrous; leaves acutely serrate; calyx practically glabrous.....*13. V. longifolia*
      H. Leaves obviously petioled with rounded-cuneate base.
        J. Fruiting-calyx spreading; calyx-lobes connivent; stigmatic surface subtended by two sterile style-lobes.....*14. V. scabra*
        J. Fruiting-calyx ascending; calyx-lobes not connivent; stigmatic surface subtended by one sterile style-lobe.....*15. V. urticifolia*
  B. Spikes thicker or densely flowered, usually with contiguous fruits.

K. Spikes subsessile or very short-peduncled, forming a congested inflorescence, not strict; corolla-limb 2 mm. broad.....*12. V. recta*
K. Spikes peduncled, usually not congested, strict; corolla-limb 3–4.5 mm. broad.....*16. V. hastata*
A. Spikes solitary or in 3's at the apices of stem and branches, or panicled and subtended by leafy bracts at the base; floral bracts prominent or not.
L. Schizocarp readily separating into 4 nutlets at maturity.
M. Leaves serrate-dentate or shallowly incised, or predominantly entire.
N. Leaves serrate or serrate-dentate or shallowly incised; spikes with more or less contiguous fruits.
O. Plants coarse, more or less densely hirsute-pubescent or hirsute-villous; leaves elongate-elliptical to ovate-orbicular; spikes stout at anthesis, 7–10 mm. broad.
P. Leaves elongate-elliptical to ovate-acuminate, short-petiolate; corolla-limb 5–6 mm. broad.
Q. Plants hirsute-hispidulous; spikes flexuous, elongated and open in fruit; bracts not exceeding the fruiting calyx; nutlets 2 mm. long, shallowly scrobiculate above, sulcate toward the base.....*21. V. macrodonta*
Q. Plants hirsute-pubescent; spike strict, dense in fruit; bracts surpassing the fruiting calyx; nutlets 2.5 mm. long, reticulate-scrobiculate above, striate toward the base.....*20. V. MacDougalii*
P. Leaves ovate-orbicular, sessile; corolla-limb 8–9 mm. broad.....*19. V. stricta*
O. Plants more slender, hirtellous or sparsely strigillose with short trichomes, canescent or not; leaves linear to narrowly elliptical or spathulate; spikes at anthesis 5–6 mm. broad.
R. Leaves strigillose; inflorescence not glandular-pubescent.....*17. V. simplex*
R. Leaves hirtellous; inflorescence glandular-pubescent.
S. Leaves hirtellous; rhachis more or less angulate; bracts lanceolate-acuminate; corolla-limb 3–4 mm. broad...*18. V. Orcuttiana*
S. Leaves hirtellous and canescent; rhachis scarcely angulate; bracts ovate-acuminate; corolla-limb 6–8 mm. broad.....*26b. V. neomexicana* var. *hirtella*
N. Leaves predominantly entire (mostly linear, the lower ones with a few salient teeth); spikes with more or less remote fruits..*27. V. perennis*
M. Leaves deeply incised-dentate or pinnatifid or 3-cleft.
T. Spikes not essentially bracteose; flowers readily seen; corolla-limb 4–10 mm. broad.
U. Leaf-blades, at least the lower ones, oblong-ovate or obtusely elliptic-ovate, not narrowly elongated, usually 3-cleft with the segments incised-dentate.
V. Leaves petioled; pubescence various, but not coarsely hirsute; spikes usually stout, if slender not greatly elongated.
W. Leaves not plicate, venation not noticeably whitish near the margin; spikes stout at anthesis, elongating or not in fruit.

X. Plants pilose to hirsute-villous; leaves not scabrous above; spikes elongating in fruit; bracts not exceeding the calyx.....*22. V. prostrata*

X. Plants sparsely hirsute; leaves scabrous above; spikes occasionally elongating in fruit; bracts slightly surpassing the calyx.....*23. V. robusta*

W. Leaves more or less strongly plicate; venation noticeably whitish near the margin; spikes not stout at anthesis.....*25. V. plicata*

V. Leaves subsessile or at most very short-petioled; pubescence coarsely hirsute; spikes slender and greatly elongated..*24. V. xutha*

U. Leaf-blades, at least the lower ones, oblong-lanceolate to spathulate, narrowly elongated, usually incised-pinnatifid or incised-dentate (excl. *V. plicata*).

Y. Plants coarse with a low somewhat compact habit, canescent-hirsute; leaves subpinnatifid, contracted into a broadly margined semiamplexicaul or petiolar base.

Z. Inflorescence somewhat glandular-hirsute; bracts lanceolate.....*29. V. canescens*

Z. Inflorescence sparsely, if at all, glandular and densely hirsute; bracts ovate, abruptly acuminate.....*29a. V. canescens* var. *Roemeriana*

Y. Plants more slender with a taller and open habit, hirsute to canescent-hirtellous; leaves pinnately cleft to incised-dentate, with a narrowly margined petiolar base.

AA. Corolla-limb 4 mm. broad; commissural faces extending to the tip of the nutlet.....*26. V. neomexicana*

AA. Corolla-limb 6–10 mm. broad; commissural faces scarcely extending to the tip of the nutlet.

BB. Plant more or less hirsute; leaves pinnately cleft; bracts lanceolate.....*26a. V. neomexicana* var. *xylopoda*

BB. Plants canescent-hirtellous; leaves dentate or somewhat more deeply incised; bracts ovate.....*26b. V. neomexicana* var. *hirtella*

T. Spikes usually bracteose with somewhat foliaceous bracts at the base of the spike; flowers inconspicuous; corolla-limb 2.5–3 mm. broad (larger in *V. plicata*).

CC. Plants delicate; leaves incised-pinnatifid to pinnately cleft, not plicate; inflorescence glandular-hirtellous; nutlets 1.5–2 mm. long, scrobiculate practically to the base.....*28. V. gracilis*

CC. Plants coarse; leaves incised-dentate to subpinnatifid or 3-cleft, plicate or not; inflorescence hirsute or pubescent-hirsute; nutlets 2–2.5 mm. long, not scrobiculate to the base.

DD. Leaves more or less strongly plicate, conspicuously whitish-veined near the margin.....*25. V. plicata*

DD. Leaves not plicate nor conspicuously whitish-veined near the margin.

EE. Plants hirsute; leaves spreading-hirsute; nutlets raised-reticulate above, striate below.

FF. Leaves with a subpetiolar or semiamplexicaul base; bracts

ovate (a little longer than the flowers), abruptly acuminate, ascending.....*29a. V. canescens* var. *Roemeriana*

FF. Leaves narrowed into a margined petiole; bracts linear-lanceolate (much longer than the flowers), usually reflexed in age.....*31. V. bracteata*

EE. Plants hirsute-pubescent; leaves appressed-hirsute; nutlets only faintly reticulate or essentially smooth.....*30. V. subuligera*

L. Schizocarp tardily separating into 4 nutlets at maturity.....*32. V. carnea*

6. V. officinalis L. Sp. Pl. 20. 1753.

V. spuria L. *l.c.*

V. domingensis Urb. Symb. Ant. **5**: 484. 1908.

Stems ascending or erect, branched, glabrous or nearly so; leaves 2–7 cm. long, strigillose on both surfaces; basal and lower stem-leaves more or less ovate, narrowed below into a petiole, 1–2-pinnatifid or 3–5-cleft with parts incised; upper leaves similar but smaller and less divided; spikes paniculately disposed or in 3's or solitary, slender and elongate; bracts usually about half as long as the calyx; calyx 2–2.5 mm. long, glandular-pubescent, subtruncate, teeth minute; corolla-tube a little longer than the calyx; corolla-limb about 4 mm. broad, segments more or less rounded; nutlets trigonous, barely 2 mm. long, strongly striate, slightly reticulate above; commissural faces muricate.

Distribution: Europe; introduced in waste places in eastern North America and West Indies.

Specimens examined:

MASSACHUSETTS: Rowley, *Oakes* (G).

RHODE ISLAND: Warwick Neck, 1848, *Thurber* (G).

NEW YORK: Brooklyn, 13 Sept. 1879, *von Schrenk* (MBG).

NEW JERSEY: ballast, Camden, 30 Aug. 1874, *Parker* (G); roadside, Longacoming, Camden Co., 23 July 1867, *Parker* (G); Cold Spring, Cape May Co., 30 Aug. 1917, *Gershoy 583* (G).

PENNSYLVANIA: Philadelphia, 1844, *Lea* (MBG); Lancaster, 21 Aug. 1861, *Porter* (G); banks of Susquehanna, Harrisburg, Oct. 1852, *Porter* (G); York Furnace, York Co., 28 June 1899, *MacElwee 873* (MBG).

DELAWARE: Wilmington, 1845, *Tatnall* (G).

DISTRICT OF COLUMBIA: vicinity of Washington, 23 June 1878, *Ward* (MBG).

VIRGINIA: Parksley, 11 Sept. 1902, *Norton* (MBG); Bedford Co., 30 June 1870, *Curtiss* (MBG); Marion, 1892, *Small* (MBG).

NORTH CAROLINA: without data, *Curtis* (MBG); waste grounds, Moyock, 1 July 1922, *Randolph 587* (G); dry sandy bank about 3 km. west of Plymouth, 4 July 1922, *Randolph 645* (G); Clarkton, 23 June 1897, *Biltmore Herbarium 4762* (G, NY); Cranberry Forge, July 1895, *F. Wislizenus 1214* (MBG).

SOUTH CAROLINA: streets in Graniteville, 23 May 1899, *Eggert* (MBG).

GEORGIA: Rome, *Chapman* (MBG).

FLORIDA: without data, *Rugel 121* (F, MBG).

ALABAMA: Collinsville, 29 July 1897, *Eggert* (MBG); Attalla, 9 July 1898, *Eggert* (MBG).

LOUISIANA: Port Eads, 22 Aug. 1900, *Tracy & Lloyd* (G, MBG, NY).

TENNESSEE: along the banks of Doe River, Carter Co., 16–17 July 1891, *Small & Heller 484* (G, MBG); Knoxville, July 1893, *Ruth* (MBG); Hollow Rock, Carroll Co., 5 Aug. 1897, *Eggert* (F, MBG).

WEST INDIES:

BERMUDA: Hamilton Parish, 11 July 1905, *Moore 2939a* (G); Flatts, 31 Aug.–20 Sept. 1905, *Brown & Britton 28* (ANSP, G, NY); Flatts, 3 Aug. 1915, *Collins 267* (G, NY); Bailey's Bay, 10 Feb.–9 March 1908, *Brown 492* (ANSP, G, NY); St. George's, 18 Jan. 1912, *Robinson 113* (G).

SANTO DOMINGO: Angostura del Rio Yaqui, 8 May 1887, *Eggers 1828* (NY), TYPE collection of *V. domingensis;* Culo de Maco, Prov. Azua, Aug. 1912, *Fuertes 1856* (NY); Loma Rosilla, Prov. de la Vega, July 1912, *Fuertes 1771* (NY); vicinity of Mission, Fonds Varettes, 12 April–4 May 1920, *Leonard 3939* (G, NY).

CUBA: without data, *Wright 3658* (G); Vecindad de Vento, May 1906, *Baker 2591* (NY, P); Playa de Marianao, 29 March 1911, *Britton & Cowell 10326* (NY); near Playa de Marianao, *Leon* (NY), *Leon & Edmunds* (NY); cultivated field, Campo Florido, Prov. Havana, 13 March 1905, *Curtiss 677* (ANSP, G, MBG, NY).

On the whole, the specimens from Santo Domingo and Cuba differ from the typical *V. officinalis* in their slender and more elongate habit; the inflorescence is scarcely as glandular, the flowers are smaller, and the nutlets often do not exceed 1.5 mm. in length. Nevertheless, the Cuban specimens vary greatly in size, and *Curtiss 677* is hardly separable from typical *V. officinalis*. Since many of the specimens are rather poor, it appears probable that they may very well represent an impoverished condition. Urban himself was somewhat uncertain of the status of his species as he appended the following note in a later publication: "An re vera a formis V. officinalis L. separanda?"

7. V. menthaefolia Benth. Pl. Hartw. 21. 1839.

V. setosa Mart. & Gal. Bull. Acad. Brux. **11**[2]: 321. 1844.

Stems decumbent or ascending, branched, sparsely and minutely hispidulous; leaves ovate, tapering at base into a margined petiole, 3–6 cm. long, deeply cleft or subincised with divisions remotely serrate-dentate, strigillose on both surfaces, somewhat pustulate above; spikes panicled, slender, elongate, compact only at the apex; bracts ovate-lanceolate, acuminate, variable in length, usually shorter than the calyx, ciliate and sparsely strigillose; calyx 2.5–3 mm. long, strigillose, sparsely (if at all) glandular, teeth minute; corolla-tube only slightly longer

than the calyx; corolla-limb about 6 mm. broad, segments more or less truncate; nutlets trigonous with convex back, 2–2.5 mm. long, striate, raised-reticulate above; commissural faces muricate.

Distribution: Arizona to southern California, northwest Mexico to Oaxaca.

Specimens examined:

ARIZONA: north of Yuma, 26 April 1906, *Jones* (P).

CALIFORNIA: San Diego, May 1852, *Thurber 555* (G), June 1875, *Palmer 308* (MBG), 5 May 1903, *Abrams 3406* (G, MBG, NY, P), 6 July 1915, *Macbride & Payson 781* (G), 17 April 1918, *Carlson* (G), in canyons, Aug. 1918, *Spencer 971* (G, P), waysides, 31 Oct. 1919, *Spencer 1414* (G, P); Otay Creek, San Diego Co., 27 March 1923, *Peirson 3379* (P).

MEXICO:

LOWER CALIFORNIA: Salton River Crossing, 27 April 1894, *Schoenfeldt 2915* (G, NY, US); sandy roadside, Tia Juana, 1 Feb. 1920, *Bartram* (ANSP); ranch, 46 km. southwest of Tia Juana, 13 April 1925, *Jones* (P); base of Cucopa Mountains, 6 April 1905, *MacDougal 153* (NY).

SONORA: vicinity of Alamos, 16 March 1910, *Rose, Standley & Russell 12934* (US); vicinity of Hermosillo, 6 March 1910, *Rose, Standley & Russell 12451* (US); vicinity of Navojoa, 21 March 1910, *Rose, Standley & Russell 13130* (US).

SINALOA: collection of 1921, *Ortega 4215* (US); vicinity of Fuerte, 25 March 1910, *Rose, Standley & Russell 13447* (US); vicinity of San Blas, 24 March 1910, *Rose, Standley & Russell 13422* (NY, US); Topolobampo, 15–25 Sept. 1897, *Palmer 268* (US); near Plomosas, 18 July 1897, *Rose 1763* (US).

CHIHUAHUA: valley of the San Pedro, Ortiz, 11 April 1887, *Pringle 1599* (MBG).

COAHUILA: near Saltillo, 7 May 1848, *Gregg 11* (MBG); near Saltillo, 14 July 1848, *Gregg 265* (G, MBG); vicinity of Saltillo, May 1898, *Palmer 191* (G, MBG, NY, US); vicinity of Buena Vista, 24 July 1848, *Gregg 276* (MBG); valley of Parras, 11 April 1847, *Gregg 406* (MBG, NY); San Lorenzo de Laguna, about 120 km. southwest of Parras, 1–10 May 1880, *Palmer 1042* (ANSP, G, US).

DURANGO: near El Salto, 12 July 1898, *Nelson 4577* (MBG, US); bottom-lands and ravines, Durango, April–Nov. 1896, *Palmer 153* (F, G, MBG, NY, US), *356* (G, MBG, NY, US).

SAN LUIS POTOSI: Alvarez, 28 Feb.–3 Oct. 1902, *Palmer 141* in part (F, G, MBG, NY, US); San Luis Potosi, 1878, *Parry & Palmer 717* (G).

AGUASCALIENTES: near Aguas Calientes, 10 Oct. 1903, *Rose & Painter 7799* (US).

GUANAJUATO: margin of stream, Sirena Mountain, 1894, *Duges* (G); Leon, 1839, *Hartweg 175* (K TYPE, NY).

QUERETARO: vicinity of Queretaro, 1912, *Basile 99* (US); Queretaro, 1910–13, *Arsène & Agniel 10242* (F, G, MBG, US); Queretaro, July 1914, *Arsène 9998* (US).

VERA CRUZ: Maltrata, 20 Aug. 1891, *Seaton 7* (F, G, US); Huatusco, 1857, *Mohr* (US).

HIDALGO: Sierra de Pachuca, 20–24 July 1905, *Rose, Painter & Rose 8753* (G, NY, US); Nopala, Aug. 1913, *Salazar* (US); Moran, 1840, *Galeotti 778* (K), TYPE collection of *V. setosa*.

MEXICO: near Tlalnepantla, 6 July 1905, *Rose, Painter & Rose 8382* (G, US); Lomas de Santa Fe, July 1928, *Lyonnet* (US); Valley of Mexico, 1865–66, *Bourgeau 360* (US), *547* (G); Valley of Mexico, 27 June 1901, *Pringle 8534* (ANSP, F, G, MBG,

NY, P, US); mountains between Toluca and Mexico City, 28 June 1910, *Rusby 181* (NY).

Morelos: La Cascada, 29 May 1901, *Pringle 9529* in part (F, US).

Michoacan: Morelia-Rincon, *Arsène 2798* (G); east of Maravatio, 30 April 1844, *Gregg 823* (MBG).

Oaxaca: mountains, San Juan del Estado, 18 June 1894, *L. C. Smith 27* (G); Sierra de San Felipe, 20 Aug. 1894, *Pringle 5715* (G); between Coixtlahuaca and Tamazulapam, 12 Nov. 1894, *Nelson 1943* (US); between Las Sedas and Salome, 30 Aug. 1921, *Conzatti 4207* (US).

In the specimens cited from California south including Sinaloa, the inflorescence is more densely strigillose than in the collections from the southern part of Mexico, the calyces are about 1 mm. longer, with teeth strongly unequal and the subtending bracts often as long as the calyces. Although this apparently indigenous species has been known generally as *V. officinalis*, it has somewhat harsher pubescence and is scarcely, if at all, glandular. The fruiting calyx tends to be connivent, concealing the apex of the schizocarp rather than open and disclosing it. Perhaps these are differences only of degree and may be merely variations of *V. officinalis;* nevertheless, for the present it seems preferable to retain the name *V. menthaefolia* for the American representative.

8. V. Halei Small, Bull. Torr. Bot. Club **25:** 617. 1898.

V. leucanthemifolia Greene, Pittonia **5:** 135. 1903.

Stems usually several from a woody base, erect, ascendingly branched, glabrous or strigillose above; leaves 3–10 cm. long, strigillose on both surfaces, diverse in outline—the basal and lower stem-leaves oblong to ovate, tapering into a petiole approximately as long as the blade, irregularly dentate or incised; the middle stem-leaves 1–2-pinnatifid with shorter petioles; the upper sparingly dentate or entire; spikes paniculately disposed, slender and elongate; bracts about one-half as long as the calyx, appressed, ciliate; fruiting calyx 3–3.5 mm. long, strigillose, subtruncate, the broad nerves terminating in unequal subulate teeth; corolla-tube scarcely longer than the calyx; corolla-limb 6–7 mm. broad, segments retuse; nutlets trigonous, approximately 2.5 mm. long, usually prominently striate, raised-reticulate at apex; commissural faces muricate.

Distribution: Alabama to Texas, Mexico.

Alabama: without data, *Buckley* (MBG); Frascati, 11 May 1904, *Deweys* (G).

MISSISSIPPI: cultivated grounds near coast, May 1859, *Hilgard* (MBG); Ocean Springs, 14 Sept. 1891, *Seymour 50* (G); Ocean Springs, June 1892, *Skehan 109* (G, MBG), *46* (G); Biloxi, 9 June 1900, *Tracy* (NY); Natchez, June 1898, *Shimek* (MBG).

LOUISIANA: without data, *Riddell 1268* (NY); without data, *Hale* (G), *245* (NY); sandy open ground, Natchitoches, 24 April 1915, *E. J. Palmer 7369* (MBG); Alexandria, 29 Aug. 1847, *Gregg* (MBG); vicinity of Covington, 1920, *Arsène 11831, 12242* (US); Gretna, opposite New Orleans, 5 May 1899, *Ball 344* (G, MBG, NY); Madisonville, 14 May 1888, *Joor* (MBG); along Calcasieu River near Lake Charles, 11 April 1925, *Small & Wherry 11774* (NY); Cameron, 4 July 1903, *Tracy 8709* (F, G, MBG, NY); vicinity of Cameron, 4 Dec. 1910, *McAtee 1953* (US).

OKLAHOMA: south of Dougherty, Murray Co., 1 May 1926, *Stratton 62* (MBG).

TEXAS: Texarkana, *Letterman* (MBG); railroad near Polk, 13 June 1898, *Eggert* (MBG); between Iowa Park and Electra, Wichita Co., 20 Aug. 1921, *Ferris & Duncan 3337* (MBG); near Longview, 19 April 1899, *Eggert* (MBG); Dallas, *Reverchon 42* (G), *732* (MBG); Dallas, *Jones* (P); North Dallas, 27 June 1899, *Eggert* (MBG); Brazos, July 1843, *Lindheimer 155 (77)* (MBG); Tarrant Co., *Ruth 108* (G, MBG, NY, US); Van Zandt, April 1929, *Ezell 5699* (US); prairies near Granbury, Hood Co., 4 May 1900, *Eggert* (MBG); Abilene, 19 May 1902, *Tracy 7996* (F, G, MBG, NY); near Comanche, 8 May 1900, *Eggert* (MBG); Waco, 1904, *Pace 22* (MBG); Gurley, 20 April 1907, *Howell 362* (US); San Augustine, 19 April 1916, *E. J. Palmer 9485* (MBG); College Station, Brazos Co., 28 April 1917, *E. J. Palmer 11715* (MBG); Mill Creek, April 1839, *Lindheimer* (MBG); near Houston, March 1842, *Lindheimer 155 (106)* (MBG); prairies, Houston, 1872, *Hall 432* (MBG, P); Houston, 21 April 1899, *Eggert* (MBG); Houston, 17 April 1900, *Bush 28* (MBG, US); Galveston Island, May 1843, *Lindheimer* (MBG); Galveston Island, 22 Sept. 1901, *Tracy 7533* (F, G, MBG, NY); Alvin, 22 April 1918, *Young* (P); Columbia, 9 April 1899, *Bush 84* (G, MBG); Columbia, 20 April 1900, *Bush 77* (G, MBG, NY, US); sandy prairies, Columbia, 29 March 1914, *E. J. Palmer 5044* (MBG); Austin, 1 May 1915, *Young 77* (MBG); Austin, 7 April 1922, *Tharp 2818* (US); flood plains of Colorado River, near Austin, 2 April 1929, *Armer 5385* (US); Crab Apple Creek, Gillespie Co., *Jermy 203* (MBG); Kerrville, 4 June 1916, *E. J. Palmer 10037* (MBG); New Braunfels, April 1851, *Lindheimer 1076 (537)* (G, MBG, NY); near Bracken, 13 July 1903, *Groth 75* (G, NY); Bexar to Austin, April 1828, *Berlandier 322, 1592* (G); San Antonio, 1900, *Wilkinson* (MBG); San Antonio, 1911, *Clemens & Clemens 969, 970* (P); San Antonio, April 1922, *Schulz 766* (US); Sutherland Springs, Wilson Co., Aug. 1879, *Palmer 1043* (G); near Sabinal, 21 April 1925, *Small & Wherry 11998* (NY); Del Rio, 20 April 1930, *Jones 26229* in part (P); Uvalde, 11 May 1918, *E. J. Palmer 13564* (MBG); Uvalde, 28 April 1928, *E. J. Palmer 33604* (MBG, NY); Millett, 11 May 1897, *Trelease* (MBG); Cuero, 22 March 1907, *Howell 313* (US); prairies near Goliad, 8 April 1900, *Eggert* (G, MBG); Refugio, 8 March 1916, *E. J. Palmer 9111* (MBG); Corpus Christi, 5–12 March 1894, *Heller 1419* (G, MBG, NY, US); Corpus Christi, 1 May 1913, *Orcutt 5867* (MBG); Kingsville, 25 March 1920, *High 52* (MBG); near Laredo, Aug. 1899, *Mackenzie 96* (MBG); near Laredo, 6 April 1901, *Eggert* (MBG); Rio Hondo, Cameron Co., Sept. 1913, *Chandler* (G, MBG); Sierra Blanca, 11 April 1930, *Jones 26229* in part (MBG).

MEXICO: TAMAULIPAS: Matamoros, *Berlandier 1511, 3016* (G, MBG); vicinity of Tampico, 1–31 Jan. 1910, *Palmer 78* (F, G, MBG, NY, US).

A species closely related to *V. menthaefolia* and *V. officinalis*,

but readily distinguished by the diverse outline of the leaves and the somewhat more slender achenes.

9. V. riparia Raf. ex Small & Heller, Mem. Torr. Bot. Club **3:** 12. 1892.

? *V. hastata* var. *β oblongifolia* Nutt. Gen. **2:** 40. 1818.

V. urticifolia var. *riparia* Britton, Mem. Torr. Bot. Club **5:** 276. 1894.

Stems 6–15 dm. tall, erect, sparsely pubescent or glabrate, widely branched; leaves oblong to ovate, 4–12 cm. long, petioled, pinnatifid or nearly tripartite toward the base, sparsely strigillose on both surfaces, venation prominent beneath; spikes paniculately disposed, slender, elongate; bracts lanceolate-ovate, as long as the calyx at anthesis, acuminate; calyx 3 mm. long, minutely glandular-pubescent, subtruncate, teeth minute; corolla-tube only slightly longer than the calyx, puberulent without; corolla-limb 3.5 mm. broad; segments more or less rounded, the middle posterior one emarginate; nutlets oblong, 2–2.5 mm. long.

Distribution: New Jersey and Virginia to North Carolina (acc. to Small).

Specimens examined:

VIRGINIA: Marion, Smyth Co., 1 July 1892, *Small* (P); Marion, Smyth Co., 6 July 1892, *Small* (G, MBG).

NORTH CAROLINA: near Globe, Caldwell Co., 3 July 1891, *Small & Heller* (F); near falls of Yadkin, Stanley Co., 18 Aug. 1891, *Small & Heller* (F).

The material at hand is too scanty and too immature to give many clues to the probable relationship of this species. It would seem as nearly related to *V. officinalis* as to either *V. hastata* or *V. urticifolia*. It is characterized by pinnatifid or tripartite leaves, minutely glandular-pubescent inflorescence, and fruit about twice as long as thick.

10. V. Ehrenbergiana Schauer in DC. Prodr. **11:** 548. 1847.

Stem erect, branched, hirsute; leaves trifid with lateral lobes small, somewhat ovate with cuneate base narrowed into a margined petiole, attenuate at apex, 4–8(–10) cm. long, coarsely serrate-dentate, strigillose above, hirtellous below, also somewhat paler and prominently veined; spikes paniculately disposed, very slender, remotely flowered; bracts ovate, about one-half as long as the calyx or shorter, subulate, ciliate; fruiting calyx

about 1.5 mm. long, strigillose, lobes very short, obtuse, mucronate; corolla inconspicuous, limb about 1 mm. broad; nutlets trigonous with convex back, 1 mm. long; commissural faces meeting sharply at right angles, almost smooth.

Distribution: Mexico.
Specimens examined:
MEXICO:
COAHUILA: Saltillo, July 1880, *Palmer 2037* (G).
NUEVO LEON: moist places near Monterey, July 1888, *Pringle 1948* (ANSP, F, G, MBG, NY, US).
SAN LUIS POTOSI: Tancanhuitz, Feb. 1888, *Seler 722* (G, US); Rio Verde, 17 Nov. 1910, *Orcutt 5423* (MBG); Bagre, Minas de San Rafael, July 1911, *Purpus 5451* (F, G, MBG, NY, US).
HIDALGO: Cazadero, April 1841, *Liebmann 11335* (US).
VERA CRUZ: Wartenberg, near Tantoyuca, 1858, *Ervendberg 153* (ANSP, G).
PUEBLA: Pahuatlan, 12 July 1913, *Salazar* (US).
MEXICO: near Los Reyes, *Ehrenberg 713* (Bot. Mus. Berl.-Dahl. TYPE, MBG phot.).

In general habit this species somewhat approaches *V. carolina*. It differs, however, in its tripartite leaves, smaller flowers, and fruits. The collection from Saltillo is much more densely hirsute on all parts, but apparently is conspecific.

11. V. carolina L. Syst. ed. 10, 852. 1759; Sp. Pl. ed. 2, 29. 1762.

V. caroliniana Willd. Sp. Pl. **1**: 119. 1798.
V. polystachya HBK. Nov. Gen. et Sp. **2**: 274. 1818.
V. biserrata HBK. *l. c.* 275.
V. veronicaefolia HBK. *l. c.*
V. hirsuta Mart. & Gal. in Bull. Acad. Brux. **11**²: 321. 1844.
V. mollis Mart. & Gal. *l. c.* 323.
V. paucifolia Mart. & Gal. *l. c.* 324, as *V. pauciflora* M. & G. in Walp. Rep. **6**: 687. 1846–47.
V. caroliniana forma or var. *polystachya* (Kunth) Loes. in Fedde, Rep. Sp. Nov. Veg. **9**: 362. 1911.

Stems erect or ascending, usually solitary, branched, hirsute-hispid; leaves lanceolate-oblong or somewhat elliptical, 3–8(–12) cm. long, obtusish or acute, subsessile or narrowed into a short petiole, coarsely crenate-serrate, strigose and somewhat pustulate above, hirsute-strigose especially along the midrib and veins beneath; spikes paniculately disposed, slender, open in fruit; bracts ovate, varying in length, usually about one-half as long as

the calyx or shorter, acuminate-subulate, somewhat spreading, ciliate; fruiting calyx approximately 2 mm. long, with the obtuse mucronate lobes connivent, hispidulous; corolla-tube scarcely exserted; corolla-limb inconspicuous, about 2 mm. broad; mature schizocarp inclosed by calyx; nutlets trigonous with convex back, hardly 1.5 mm. long, faintly striate; commissural faces meeting at right angles, almost smooth.

Distribution: Arizona and Mexico to Salvador, Central America.

Specimens examined:

ARIZONA: Wilgus Ranch, Chiricahua Mountains, 12 Oct. 1907, *Blumer 1783* (G, MBG, NY, US); Cave Creek, Chiricahua Mountains, 2 Sept. 1929, *Harrison & Kearney 6144* (US); Santa Rita Mountains, 15 July 1881, *Pringle* (G); Fort Huachuca, July 1893, *Wilcox* (NY); Huachuca Mountains, 4 Sept. 1903, *Jones* (P, US); Ramsay Canyon, Huachuca Mountains, 30 Sept. 1929, *Jones 25006* (G, NY).

NEVADA: Carson Valley, Aug. 1872, *Lemmon 3075* (G).

MEXICO: without data, *Graham* (G); collection of 1844, *Galeotti 795A* (G, US).

LOWER CALIFORNIA: Sierra de San Francisquito, 1 Oct. 1899, *Brandegee* (NY).

SONORA: Santa Cruz, 22 Oct. 1893, *Mearns 2627* (US); Cochuto, 1 Oct. 1890, *Hartman 94* (G, NY, US); La Cruz de los Canadas, 3 Nov. 1890, *Lloyd 448* (G).

SINALOA: near Colomas, foothills of Sierra Madre, 15 July 1897, *Rose 1677* (US); Santa Lucia, 1919, *Dehesa 1551* (US).

CHIHUAHUA: Norogachi, Aug.–Nov. 1885, *Palmer 364* (ANSP, G, US); San Diego Canyon, Sierra Madre Mountains, 16 Sept. 1903, *Jones* (P); Guayanopa Canyon, Sierra Madre Mountains, 23 Sept. 1903, *Jones* (P).

DURANGO: rich bottom-lands, vicinity of Durango, Apr.–Nov. 1896, *Palmer 339* (F, G, MBG, NY, US).

NAYARIT: west of Tepic, 31 May 1849, *Gregg 1001* (MBG); Tepic, 5 Jan.–6 Feb. 1892, *Palmer 2057* (US).

JALISCO: Cuidad Guzman, 14 Oct. 1921, *Kempton & Collins* (US).

GUANAJUATO: Guanajuato, 1880, *Duges* (G).

HIDALGO: Real del Monte, 15 Sept. 1910, *Clokey 1865* (MBG); near Moran, *Humboldt & Bonpland* (Par. TYPE of *V. veronicaefolia*, MBG phot.).

VERA CRUZ: Sierra Templada in general, June–Oct. 1840, *Galeotti 735* (K), TYPE collection of *V. hirsuta;* Orizaba, 1853, *Mueller* (NY); Orizaba, 1855, *Mueller 766, 887* (NY); Orizaba, 1855–7, *Botteri 180* (F, G, MBG, US); Orizaba, 1857, *Mohr* (US); Jalapa, *Schiede 88* (NY); Jalapa, Jan. 1894, *C. L. Smith 1737* (G).

PUEBLA: region of Atoyac, near Puebla, 15 July 1909, *Nicholas* (US); Tezuitlan, 9 June 1910, *Orcutt 4045* (F).

MEXICO: near city of Mexico, *Humboldt & Bonpland* (Par. TYPE of *V. biserrata*, MBG phot.); valley of Mexico to Tizapan, 19 Aug. 1865–66, *Bourgeau 119* (G, US); Chalco region, 4 Oct. 1921, *Kempton & Collins* (US); near Tlalpam, 1905, *Rose, Painter & Rose 8496* (US); Tlalpam, 9 Aug. 1910, *Orcutt 3488* (F, US); Eslava, 15 June 1901, *Pringle 9312* (F, G, MBG, NY, US); near Toluca, 18 Sept. 1889, *Pringle 2813* (F, G).

MORELOS: fields, La Cascada, 29 May 1901, *Pringle 9529* in part (G, MBG, NY); Toro, 5 Aug. 1924, *Fisher* (F, MBG); Tepoztlan, autumn 1926, *R. Redfield 4* (US).

MICHOACAN: Morelia, Coronilla, 8 Aug. 1909, *Arsène 3000* (US); Quinceo, near

Morelia, 11 Nov. 1909, *Arsène* (US); on slope of volcanic mountain, Xorullo, *Humboldt & Bonpland* (Par. TYPE of *V. polystachya*, MBG phot.).

COLIMA: Colima, 9 Jan.–6 Feb. 1891, *Palmer 1156* (G, NY, US).

OAXACA: mountains near Oaxaca, June–Oct. 1840, *Galeotti 737* (K), TYPE collection of *V. mollis;* Sierra de San Felipe, 12 Sept. 1894, *Pringle 4892* (ANSP, G, MBG, NY, US); Sierra de San Felipe, 2 Oct. 1894, *C. L. Smith 224* (MBG, NY, US); vicinity of La Parada, 19 Aug. 1894, *Nelson 1021* (US); Cuyamecalco, 5 Sept. 1895, *L. C. Smith 634* (G).

CENTRAL AMERICA:

GUATEMALA: uncultivated places, Oct. 1865, *Bernoulli 127* (NY); without locality, Sept. 1927, *Morales 786* (US); without locality, 1892, *Heyde 120, 530, 477* (US); San Siguan, Dept. Quiche, April 1892, *Heyde & Lux 3018* (ANSP, MBG, US); Coban, Dept. Alta Verapaz, Nov. 1902, *von Tuerckheim 8442* (F, G, NY, US); Coban, Dec. 1906, *von Tuerckheim II 651* (F, MBG); Tactic, Dept. Alta Verapaz, May 1886, *von Tuerckheim 913* (G, US); vicinity of Los Amates, Dept. Izabal, 24 May 1922, *Standley 24443* (MBG, US); Proderos, Dept. Guatemala, July 1921, *Tonduz 628* (US); Chilloui, Dept. Guatemala, 20 June 1921, *Rojos 44* (US); Volcan Pacaya, Dept. Amatitlan, July 1892, *Shannon 3638* (US); San Vincente, Pacaya, Dept. Amatitlan, 5 May 1921, *Tonduz 488* (US); San Lucas, Dept. Solola, 16 Feb. 1906, *Kellerman 5825* (US); San Pedro, 1913, *Tejada 72* (US); Tejutla, 1913, *Tejada 57* (US); Santa Rosa, Dept. Santa Rosa, May 1892, *Heyde & Lux 3019* (G in part, NY, US); vicinity of Siguatepeque, Dept. Comayagua, 14–27 Feb. 1928, *Standley 55944* (F, US).

SALVADOR: vicinity of Apastepeque, Dept. San Vincente, 4 March 1922, *Standley 21331* (G, MBG, US); vicinity of San Salvador, *Renson 175* (NY, US); Plazuela de Aculhaca, San Salvador, Dec. 1906, *Velasco 8999* (US); Amatepeque Hill, near San Salvador, 2 Feb. 1907, *Pittier 1909* (US); San Salvador, 1922, *Calderon 794* (G, US); vicinity of San Salvador, 30 March–24 April 1922, *Standley 22414* (G, NY, US); vicinity of Santa Tecla, Dept. La Libertad, 10 April 1922, *Standley 23083* (G, US); Finca San Nicolas, 1923, *Choussy 36* (US).

This species is probably most nearly related to *V. urticifolia* and *V. scabra*, but is easily set apart from them by its subsessile or very short-petiolate leaves; moreover, their areas of distribution are practically distinct. The collections cited appear to be conspecific, notwithstanding the fact that they vary greatly in size, serration of leaves, and length of floral bracts. The specimens from the northern part of the range are slightly coarser, with leaves more remotely crenate-serrate, yet they match very closely *Pringle 4892*, from the Sierra de San Felipe, Oaxaca. In the latter, however, the leaves are more densely pubescent on the under surface. The specimens from Guatemala and Salvador have somewhat crowded spikes and are, as a whole, smaller in every way and more densely hispidulous. However, since most of the collections were made from December to February, it seems as if this more compact habit might be a seasonal rather than a geographic variation.

A specimen labelled "Inter Tallahassee et St. Marks, Florida, legit Rugel, April–June 1843" appears in the herbarium of the Missouri Botanical Garden. As this is the only representative of *V. carolina* seen from Florida, and as it is so far from the natural range of the species, it would appear to be an error in labelling. Another collection worthy of mention is *Nelson 752*. It is almost glabrous, and the lobes of the corolla are emarginate, a rather unusual feature in this series. The lack of pubescence suggests *V. longifolia*, but unfortunately none of the available material of the species is in sufficiently good condition to reveal the character of the corolla. Although the general habit of the collection is that of *V. carolina*, it is rather doubtfully conspecific.

12. V. recta HBK. Nov. Gen. et Sp. **2**: 277. 1818.

V. caroliniana forma or var. *recta* (Kunth) Loes. in Fedde, Rep. Sp. Nov. Veg. **9**: 362. 1911.

Stem erect, branched, hispidulous, reddish; leaves lanceolate-oblong to ovate with cuneate base narrowed into a short margined petiole, 4–8 cm. long, acute, serrate-dentate, reticulately veined, strigillose on both surfaces, minutely pustulate above; spikes numerous, congested at the apices of stems and branches, short-cylindrical, usually dense but not strict; bracts a little shorter than the calyx, ovate-lanceolate, acuminate, hispidulous; fruiting calyx about 2 mm. long, hispidulous, lobes short, obtuse, mucronate, commonly connivent; corolla-tube scarcely exserted; corolla-limb inconspicuous; nutlets trigonous with convex back, 1.5–2 mm. long, faintly striate; commissural faces meeting at right angles, practically smooth.

Distribution: Mexico.

Specimens examined:

MEXICO:

HIDALGO: Real del Monte, 12 July 1913, *Salazar* (US); between Pachuca and Cerro Ventoso, *Humboldt & Bonpland 4066* (PAR. TYPE, MBG phot.).

PUEBLA: Huitzuilzilapam, 9 June 1910, *Orcutt 3950* (F).

MEXICO: Cima Station, 30 Aug. 1905, *Pringle 13597* (G, US); Toluca, *Berlandier 1222* (US).

MORELOS: Tres Marias, 4 July 1901, *Rose & Hay 5310* (US); Toro, 5 Aug. 1924, *Fisher 320* (MBG, US).

OAXACA: vicinity of Cerro San Felipe, 1894, *Nelson 1105* (US); Sierra de San Felipe, 9 Aug. 1894, *Pringle 4769* (ANSP, F, G, MBG, NY, US).

Verbena recta, generally determined in the material at hand as "aff. *V. polystachya* HBK.," is easily distinguished from this closely related species by the short hispidulous pubescence, the commonly broader leaves, and the compact cylindrical congested spikes. The floral characters of both are similar, although generally the fruiting calyx of *V. carolina* is more acutely ovoid and the subtending bract is much sharper at the apex.

13. V. longifolia Mart. & Gal. Bull. Acad. Brux. **11**[2]: 323. 1844.

Stems erect, tall, glabrous, obtusely 4-angled; leaves lanceolate to elongate-elliptic, 10–12 cm. long, the upper somewhat smaller, decussate, short-petiolate, acutely serrate from below the middle to the apex, appressed-pubescent or very short-strigillose on both surfaces, venation prominent beneath; spikes paniculately disposed, elongate, slender, open in fruit, glabrous; bracts ovate, about one-half as long as the calyx, acute-acuminate, minutely ciliate; calyx 2 mm. long, with the obtuse lobes connivent over the schizocarp, practically glabrous; corolla-tube scarcely protruding beyond the calyx; corolla-limb inconspicuous; nutlets trigonous, hardly 1.5 mm. long, smooth or faintly striate; commissural faces smooth.

Distribution: southern Mexico.

Specimens examined:

MEXICO:

VERA CRUZ: Colipa, March 1841, *Liebmann 11318* (US); near Chila, April 1888, *Seler 724* (G, US).

PUEBLA: in vicinity of San Luis Tultitlanapa, July 1908, *Purpus 3406* (F, G, MBG, NY, US).

MORELOS: San Anton, near Cuernavaca, 14 Oct. 1904, *Seler 4194* (G, US); Cuernavaca, 28 Oct. 1905, *Seler 4347* (G, US).

OAXACA: Tehuantepec, 19 April 1910, *Orcutt 3321* (F, MBG, US).

A rather singular species combining the foliar characters of *V. litoralis* with the inflorescence characters of *V. carolina*.

14. V. scabra Vahl, Eclog. Am. **2**: 2. 1798, not *V. scabra* Marnock, Floricult. Mag. **5**: 87, *pl. 54, fig. 2*. 1840–41.

Stem 1 m. more or less tall, erect, solitary, simple or branched, hispidulous; leaves ovate to elongate-ovate, 3–10(–13) cm. long, 2.5–5 cm. broad, petiolate, serrate-dentate, acute or obtusish,

scabrous and commonly strigillose above, less scabrous and somewhat paler beneath, also hispidulous along the veins; spikes paniculately disposed, slender, pedunculate, copiously and closely flowered; bracts ovate-acuminate, about half as long as the calyx, hispidulous; fruiting calyx 2.5–3 mm. long, hispidulous, ovoid, with the somewhat unequal lobes acutely connivent, diverging from the rhachis of the spike 45° or more; corolla-tube scarcely, if at all, longer than the calyx; corolla-limb about 2 mm. wide, lobes obtuse; anthers glandless; stigmatic surface midway between two almost equal obtusish sterile lobes; nutlets trigonous, 1–1.3 mm. long, faintly striate, reticulate above; commissural faces extending to the top of the schizocarp, meeting sharply at right angles, muriculate.

Distribution: North Carolina, Florida west to California, south into northwestern Mexico; West Indies.

Specimens examined:

North Carolina: moist rich soil, open swamp land, Wilmington, 25 July 1922, *Randolph 1012* (G).

Florida: without locality, 1842–49, *Rugel 156* (F, MBG); common in everglades, 27 Aug. 1925, *O'Neill* (MBG); vicinity of Mayport and Jacksonville, 1870–76, *Keeler* (NY); near Jacksonville, 25 June–13 July 1894, *Curtiss 5111* (MBG, NY); Lake City, 21 July 1893, *Quaintance* (MBG); vicinity of Eustis, Lake Co., 1–15 July 1894, *Nash 1248* (G, MBG, NY); low ground, Orange Co., 22 July 1902, *Fredholm 5416* (G, MBG, P, US); open low ground, near Lake Okeechobee, 20 May 1925, *E. J. Palmer 27462* (MBG); east shore of Lake Okeechobee, 11–25 Nov. 1913, *Small & Small 4337* (NY); east shore of Observation Island, 11–25 Nov. 1913, *Small & Small 4403* (NY); hammocks along Taylor Creek, 11–25 Nov. 1913, *Small & Small 4341* (NY); Fort Lauderdale, 19–25 Nov. 1903, *Small & Carter 1072* (F, NY); moist sandy soil, Hollywood, Broward Co., 10 Feb. 1930, *Moldenke 591, 599a* (MBG, NY); everglades west of Miami, 3 Nov.–7 Dec. 1912, *Small 4020* (NY); hammocks near Miami River, 26 Nov.–20 Dec. 1913, *Small & Small 4520* (NY); Biscayne Bay-Indian River, *Palmer 397* (G, MBG); Myers, Lee Co., July–Aug. 1900, *Hitchcock 269* (MBG); sandy ditch, south of Estero, Lee Co., 14 April 1930, *Moldenke 972* (MBG, NY); Sanibel Island, 18 May 1901, *Tracy* (NY); Manatee, 8 May 1900, *Tracy 6652* (G, MBG, NY); Hernando Co., June–July 1898, *Hitchcock* (MBG); near Tallahassee, *Berg* (NY); shore of Dog Island Sound, near Lanark, 26 July 1920, *Harper 242* (NY, US); streets of Apa[lachicola], *Chapman* (MBG).

Mississippi: Scranton, Jackson Co., 5–6 Aug. 1896, *Pollard 1191* (G, MBG, NY); Ocean Springs, 13 Aug. 1895, *Skehan* (MBG).

Louisiana: South Pass, 20 Aug. 1900, *Tracy & Lloyd 22* (G, MBG); New Orleans, *Riddell* (G); New Orleans, *Drummond* (NY); New Orleans, 21 Oct. 1885, *Joor* (MBG).

Texas: without locality, July 1851, *Lindheimer 618* (MBG); Beaumont, Jefferson Co., 11 Sept. 1916, *E. J. Palmer 10692* (MBG); Beaumont, Sept. 1904, *Kirn 2139* (P); Houston, July 1842, *Lindheimer* (MBG); Comanche Springs, New Braunfels,

etc., Aug. 1851, *Lindheimer 1077* (G, MBG, NY); Leon River, Oct. 1850, *Bigelow* (G); San Marcos and vicinity, 1898, *Stanfield* (NY); New Braunfels, 1847, *Lindheimer* (MBG).

Arizona: north of Rice, Apache Reservation, 4 Oct. 1927, *Harrison 4897* (US); Santa Cruz River, Tucson, 11 May 1881, *Pringle* (G); banks of Santa Cruz River, near Tucson, 18 July 1884, *Pringle* (ANSP, F, G, NY, P, US).

California: without locality, *Wallace* (G); Cienega, on Santa Monica R. R., *Lyon 6* (G); Los Angeles, 1892, *Davidson* (G); near Pasadena, 17 Dec. 1892, *McClatchie* (NY); San Bernardino, Oct. 1891, *Parish* (MBG), *5338* (NY); San Bernardino Valley, *Parish & Parish 1043* (F, MBG); San Bernardino Valley, 25 July 1909, *Parish 7149* (P); 3 km. south of San Bernardino, 2 Sept. 1924, *Johnston* (P); Upland, July 1917, *Johnston* (P); 8 km. southeast of Chino, *Munz & Johnston 11289* (P); Cocomozo Mountains, Aug. 1881, *Parish & Parish 11143* (G).

Mexico:

Lower California: San Tomas, 15 July 1885, *Orcutt 1302* (MBG).

Coahuila: Soledad, a section of low mountains with few oaks, 40 km. southwest from Monoclova, 9–19 Sept. 1880, *Palmer 1040* (ANSP, US); San Lorenzo de Laguna, 120 km. southwest of Parras, May 1880, *Palmer 1040* (G).

West Indies:

Cuba: without locality, 1865, *Wright 3659* (G); Santa Rosalia, 2 Aug. 1895, *Combs 389* (G, MBG, NY); valley of San Juan, vicinity of Matanzas, 14 March 1903, *Britton, Britton & Shafer 292* (NY); Havana, 15 Oct. 1908, *Leon 685* (NY); Havana, 21 April 1919, *Leon & Edmunds 8719* (NY); Rio Arimao, 22 March 1910, *Britton & Wilson 5771* (NY); Isle of Pines, 8 March 1916, *Britton, Wilson & Leon 15256* (NY); Pinar del Rio, 7 April 1924, *Krig 3187* (NY).

Jamaica: Port Antonio, Dec. 1890, *Hitchcock* (MBG); Port Antonio, Aug. 1910, *Lang 102* (ANSP); marsh near Black River, 12 Sept. 1907, *Harris 9937* (NY); roadside, Hopeton, 13–22 Sept. 1907, *Britton 1527* (NY); Och Rios and vicinity, 4 April 1908, *Britton & Hollick 2704* (NY); banks of Cabaritta River, Meylersfield, 16 Dec. 1914, *Harris 11808* (G, MBG, NY).

Haiti: Prov. Barahona, Aug. 1910, *Fuertes 391* (NY); Prov. La Vega, July 1912, *Fuertes 1758* (NY); Miragoane and vicinity, July 1927, *Eyerdam 201, 432* (G).

Porto Rico: without locality, *Read* (ANSP); Bayamon, 22 March 1885, *Sintenis 1074* (MBG, NY); Aybonito, 3 Nov. 1885, *Sintenis 2010* (ANSP, P); Vega Baja, 5 Nov. 1913, *Stevens & Hess 4260* (NY); El Teudal, Coamo River, 13 Feb. 1922, *Britton, Britton & Brown 6019* (NY); border of Mary Lake, near Luquillo, 3 April 1922, *Britton, Britton & Brown 7037* (NY).

Bermuda: Smith's Parish, 12 July 1905, *Moore 2947* (G, NY); Hamilton Parish, 9 July 1905, *Moore 2874* (G, NY); cultivated land north of Hamilton Parish, 31 Aug.–20 Sept. 1905, *Brown & Britton 373* (ANSP, G, NY); Washington Sound, Sept. 1913, *Brown & Britton 1631* (ANSP, NY); roadside, 3 Aug. 1913, *Collins 268* (G, NY).

Verbena scabra, often confused with *V. urticifolia*, is easily separable by the very scabrous upper surface of the leaf and the rather conspicuous divergence of the fruit from the rhachis of the spike. A quite distinctive feature is the position of the stigmatic surface apparently between two almost equal sterile

style-lobes. This condition is somewhat approached in *V. carolina*, but in the other species examined the second sterile lobe has never been so definitely developed.

15. V. urticifolia L. Sp. Pl. 20. 1753.
V. diffusa Poir. in Lam. Encyc. **8**: 550. 1808.
V. diffusa Desf. ex Spreng. in L. Syst. **2**: 748. 1825.
V. urticifolia var. *simplex* Farwell, Papers Mich. Acad. Sci. **3**: 103. 1924.

Erect herb 5–15 dm. tall; stem solitary, simple or more often branching from near the base, hirtellous to almost glabrous; leaves 8–20 cm. long, petiolate, blades broadly lanceolate to oblong-ovate, with rounded base decurrent on the petiole, short-acuminate or acute, coarsely and somewhat doubly crenate-serrate, hirtellous or glabrate on both surfaces, often minutely pustulate above; spikes paniculately disposed, slender, pedunculate, more or less sparsely flowered; bracts ovate-acuminate, very short, ciliate; calyx 2 mm. long, pubescent particularly along the nerves, lobes obtuse, not connivent, teeth short, subulate, subequal; corolla-tube scarcely exserted; corolla-limb about 2 mm. wide, lobes obtuse; mature schizocarp exposed at the distal end; nutlets trigonous with a convex back, about 2 mm. long, faintly striate; commissural faces meeting at right angles, almost smooth.

Distribution: Quebec and Ontario, Maine to Nebraska and southward.

Specimens examined:

QUEBEC: vicinity of Longueuil, Aug. 1916, *Victorin 3124* (MBG); Cape Tourmente, 40 km. below Quebec, 12 Aug. 1922, *Victorin 15750* (G).

ONTARIO: Casselman, 24 Aug. 1891, *Scott* (G); Niagara Falls, 1830, ? *Torrey 154* (NY).

MAINE: North Berwick, 25 Sept. 1897, *Fernald & Parlin 928* (G).

NEW HAMPSHIRE: Walpole, 28 July 1901, *Williams* (G); Ashuelot, 1 Aug. 1898, *Robinson 559* (G).

VERMONT: East Middlebury, 14 July 1908, *Williams* (G); Rutland, 31 Aug. 1899, *Eggleston 1531* (G); Manchester, 21 July 1898, *Day 147* (G); Brattleboro, 2 Aug. 1898, *Robinson 134* (G).

MASSACHUSETTS: Lowell, 28 July 1927, *Beattie* (P); slopes above Connecticut River, Holyoke, 7 Sept. 1926, *Seymour 601* (MBG, NY); Waverley, 10 Aug. 1878, *Lane* (G); Belmont, 27 Sept. 1891, *Deane* (G); Milton, 3 Aug. 1887, *Kennedy* (G); South Framingham, 25 July 1890, *Sturtevant* (MBG); Dedham, 22 Aug. 1897, *Williams* (G); Adams, 24 Aug. 1901, *Day 79* (G); Manchester, 18 Aug. 1895, *Williams* (G); Monson, Aug. 1897, *Morris* (MBG); Nonquit, 1888, *Sturtevant* (G).

RHODE ISLAND: dry roadside banks and thickets northeast of Great Salt Pond, Block Island, 20 Aug. 1913, *Fernald, Hunnewell & Long 10262* (G); Providence, July 1844, *Thurber* (G); Providence, 20 July 1892, *J. F. Collins* (G).

CONNECTICUT: in damp woods, Wethersfield, *Wright* (G); Hartford meadow, 3 Aug. 1882, *Wright* (G); New Haven, 1858, *Eaton* (MBG).

NEW YORK: open pasture, Canton, 18 July 1914, *Phelps 800* (G); Bolton Landing, Lake George, 11 Aug. 1906, *Seler 4560* (G); Vaughns, north of Hudson Falls, 8 Aug. 1912, *Burnham* (G); near station, Ithaca, 4 Aug. 1915, *Eames & McDaniels 4870* (G); Fall Creek, Ithaca, 12 July 1916, *Munz 616* (P); Six Mile Creek, Ithaca, 8 July 1878, *Trelease* (MBG); Fleischmanns, Delaware Co., 30 July 1892, *von Schrenk* (MBG); Port Chester, 3 Sept. 1886, *Stabler* (G).

NEW JERSEY: Green Pond, Morris Co., 21 Sept. 1886, *Britton* (NY); Denmark Pond, 7 Aug. 1910, *Mackenzie 4746* (G, MBG); Watchung, Somerset Co., 7 July 1930, *Moldenke 1330* (MBG, NY); South Amboy, July 1892, *Halsted 175* (G, NY).

PENNSYLVANIA: about Tunkhannock, 18 July 1929, *Osterhout* (P); Meadville, Aug. 1893, *Curtis* (P); Harrisburg, 20 July 1888, *Small* (G); Lancaster, 29 Aug. 1900, *Heller* (G); woodlands, Angora, 9 July 1899, *MacElwee 882* (MBG); near Philadelphia, 29 July 1871, *Redfield* (MBG); near Philadelphia, 1890, *Greenman 1376* (G, MBG).

DELAWARE: marsh along Delaware River, south of Newcastle, 2 Aug. 1923, *Tidestrom 11572* (G).

MARYLAND: College Park, *Symons* (MBG); Chesapeake City, 11 July 1923, *Tidestrom 11413* (G).

DISTRICT OF COLUMBIA: gravelly and cindery artificial soil, northeast Washington, 24 July 1893, *Boettcher 226* (G, MBG); Anacostia, 19 July 1893, *Boettcher 176* (G, MBG); Brookland, 19 July 1912, *Holm* (MBG); near Long Bridge, 11 July 1891, *Blanchard* (MBG).

VIRGINIA: Chisels Run, west of Williamsburg, 22 June 1921, *Grimes 3794* (NY); Reed Creek, Wythe Co., 23 July 1892, *Small* (MBG, NY); Marion, Smythe Co., 20 July 1892, *Small* (MBG).

NORTH CAROLINA: Cranberry Station, 13 Sept. 1885, *Britton* (NY).

SOUTH CAROLINA: near Anderson, 8 July 1919, *Davis 9117, 8458* (MBG); Santee Canal, *Ravenel* (G); Charleston, 19 Aug. 1859, *Gibbes* (NY).

FLORIDA: Apalachicola, *Chapman* (MBG); near Tallahassee, May 1843, *Rugel* (MBG).

ALABAMA: Tensaw, 22 Aug. 1904, *Tracy 8037* (G, MBG, NY).

MISSISSIPPI: Woodville, 7 Sept. 1887, *Joor* (MBG); Taylorville, 2 Aug. 1903, *Tracy* (NY).

LOUISIANA: without data, *Hale* (G); Natchitoches, 14 June 1915, *E. J. Palmer 8000* (MBG); waste ground, Alexandria, 5 June 1899, *Ball 556* (G, MBG); Lockport, 23 Oct. 1919, *Guidroz 3* (G).

OHIO: Shaker Pond, near Cleveland, 8 July 1896, *Greenman 1380* (MBG); Oberlin, June 1895, *Hicks* (MBG); Oxford, 6 June 1910, *Overholts* (MBG); Cincinnati, 18 Oct. 1930, *Stephenson* (MBG).

WEST VIRGINIA: Tygart River valley, above Huttonsville, 23 Sept. 1904, *Greenman 244* (G); banks of Blackwater River, Hendricks, 10 Sept. 1904, *Greenman 245* (G); low ground west of Salt Pond, 28 June 1922, *Randolph 474* (G).

INDIANA: East Chicago, 10 Aug. 1910, *Lansing 2806* (G).

KENTUCKY: Stamping Ground, 1 July 1930, *Singer 308* (MBG); Rockdale, July

1928, *Runyon 1260* (US); Nicholasville, 18 July 1923, *McFarland 92* (MBG); Bowling Green, Aug. 1896, *Price* (MBG); Calvert City, 16–19 June 1909, *Eggleston 4841* (NY).

TENNESSEE: borders of woods, Knoxville, July 1898, *Ruth 833* (MBG), *788* (NY).

WISCONSIN: St. Croix Falls, July 1899, *Baker* (P); Green Bay, 7 July 1878, *Schuette* (NY).

ILLINOIS: Bowmanville, Cook Co., 7 July 1896, *Chase* (MBG); Chicago, 19 Aug. 1907, *Greenman 1877* (MBG); Starved Rock, June–Sept. 1921, *Thone 50* (MBG); Urbana, 6 July 1899, *Gleason 718* (G); Olney, 17 July 1927, *Ridgway 2831* (MBG); near Alton, 24 July 1927, *Bucholz* (MBG); Freeburg, Aug. 1917, *Hertel* (MBG).

MINNESOTA: open grounds, Collegeville, Stearns Co., 29 July 1912, *Chandonnet* (MBG); near Minneapolis, July 1891, *Aiton 8467* (P); meadow, Northfield, 1912, *Goldsmith 119* (NY); Houston Co., July 1912, *Freiberg* (MBG).

IOWA: Black Hawk Co., 22 July 1929, *Burk 591* (MBG); Ames, *Hitchcock* (MBG); Ames, Sept. 1873, *Bessey* (G); Ames, Sept. 1909, *Campbell 67* (G, MBG); Bentonsport, July 1920, *Graves 1691* (MBG); Decatur Co., 13 July 1903, *Anderson* (MBG).

MISSOURI: Hannibal, Marion Co., *Davis 73, 1274a, 3453, 3591, 4450, 4565* (MBG); Ilasco, Ralls Co., 13 Aug. 1915, *Davis 3852* (MBG); Aberdeen, 11 Sept. 1911, *Davis 950* (MBG, NY); St. Louis, Aug. 1838, *Riehl 135* (MBG, NY); St. Louis, 11 Aug. 1894, *Glatfelter* (MBG); St. Louis, Sept. 1899, *Baker* (P); Creve Coeur Lake, 24 Aug. 1930, *Kellogg 15277* (MBG); Fern Glen, St. Louis Co., 14 July 1906, *Johnson* (MBG); Allenton, *Letterman* (MBG); Allenton, 27 July 1884, *Kellogg* (MBG); Kimmswick, 15 July 1885, *F. Wislizenus 282* (MBG); Victoria, 6 July 1890, *Hitchcock* (MBG); Shepard Mountain, near Arcadia, 22 July 1915, *Greenman 3766* (MBG); Poplar Bluff, 14 Aug. 1892, *Dewart 15* (MBG); Jefferson City, July 1866, *Knause* (MBG); Brumley to Bagnell, 21 Sept. 1897, *Trelease 719* (MBG); Springfield, 31 July 1892, *Dewart 18* (MBG); Willard, 9 July 1919, *Blankinship* (P); Swan, 24 Sept. 1899, *Bush 452* (MBG); Jackson Co., 7 Aug. 1893, *Bush* (MBG); bottoms, Cass Co., 24 July 1864, *Broadhead* (MBG); Webb City, 4 July 1902, *E. J. Palmer 198* (MBG); gravel bars, Butler Creek, Noel, 9 Sept. 1913, *E. J. Palmer 4229* (MBG).

ARKANSAS: waste places, near Corning, 21 Aug. 1896, *Eggert* (MBG); near McNab, 5 Oct. 1923, *Greenman 4412* (MBG); Fulton, 18 Sept. 1900, *Bush 884* (MBG).

SOUTH DAKOTA: Brookings Co., 1903, *Johnson* (MBG); Mitchell, July 1903, *Hoffstetter* (MBG); sand hills near La Creek P. O., Bennett Co., 14 Aug. 1911, *Visher 2263* (NY); Vermilion, 11 Sept. 1911, *Visher* (MBG).

NEBRASKA: Dickson's Bluffs, on Missouri River, 12 July 1853–4, *Hayden* (MBG); near Plummer Ford, Dismal River, 8 Aug. 1893, *Rydberg 1716* (NY); Lincoln, Aug. 1899, *Hedgcock* (MBG); Franklin, 1893, *Laybourne* (MBG).

KANSAS: Riley Co., 16 Aug. 1892, *Waugh* (MBG); low woods, Riley Co., 12 July 1895, *Norton 389* (G, MBG, NY); Manhattan, Sept. 1893, *Norton* (MBG); vicinity of Arkansas City, south of Arkansas River, 2 July 1929, *Rydberg & Imler 482* (NY).

OKLAHOMA: near Alva, 11 July 1913, *Stevens 1673* (G, MBG, NY); near Tonkawa, 4 Aug. 1913, *Stevens 1821* (G); 16 km. south of Stillwater, 14 July 1927, *Stratton 158* (MBG); near Cleo, 19 July 1913, *Stevens 1742* (G); vicinity of Fort Sill, 3 July 1916, *Clemens 11749* (MBG); Davis, 10 July 1916, *Emig 716* (MBG); near Grant, 4 June 1916, *Houghton 4015* (G); "Arkansas," 23 July 1894, *Bush 432* (MBG).

TEXAS: Tarrant Co., 10 Aug. 1926, *Killiam 6933* (US); Dallas, Aug. 1876, *Reverchon* (G), *734* (MBG); Houston, May 1842, *Lindheimer 195* (MBG); Columbia, 13 Oct. 1900, *Bush 1482* (MBG).

Verbena urticifolia is readily distinguished by petiolate and

rarely scabrous leaves, remotely flowered slender spikes, and unconnivent fruiting calyces. On account of its close resemblance to *V. scabra* the two were confused, and *V. urticifolia* formerly was believed to be a native of tropical America. It would now appear to be indigenous in the Middle Eastern States, establishing itself as a weed in various places.

16. V. hastata L. Sp. Pl. 20. 1753.

V. pinnatifida Lam. Tab. Encyc. **1:** 57. 1791, as *V. hastata* γ Poir in Lam. Encyc. **8:** 546. 1808.

V. paniculata Lam. Tab. Encyc. **1:** 57. 1791.

V. paniculata var. *pinnatifida* Schauer in DC. Prodr. **11:** 546. 1847.

V. hastata var. *pinnatifida* Gray, Syn. Fl. N. Am. **2**[1]**:** 336. 1878; Britton, Mem. Torr. Bot. Club **5:** 276. 1894.

V. hastata var. *paniculata* Farwell, Ann. Rept. Comm. Parks and Boul. Detroit **11:** 82. 1900.

V. hastata f. *rosea* Cheney, Rhodora **4:** 245. 1902.

V. hastata var. *paniculata* f. *rosea* Farwell, Papers Mich. Acad. Sci. **2:** 37. 1923.

Stems 4–15 dm. tall, branched above, rough-pubescent with short antrorse hairs; leaves lanceolate, oblong-lanceolate or occasionally ovate-lanceolate, 5–15(–18) cm. long, gradually acuminate, petiolate, coarsely or incised serrate, often hastately 3-lobed at base, veins impressed above, rough-pubescent on both surfaces; spikes strict, usually numerous in a panicle, pedunculate, compact; bracts lanceolate-subulate, commonly a little shorter than the calyx; calyx 2.5–3 mm. long, pubescent, lobes acute with short subulate tips, more or less connivent; corolla-tube somewhat longer than the calyx, pubescent without; corolla-limb 3–4.5 mm. broad; nutlets about 2 mm. long, nearly smooth or very faintly striate; commissural faces muriculate or almost smooth.

Distribution: Nova Scotia to British Columbia, south throughout the United States.

NOVA SCOTIA: bank of Five-mile River, Hants Co., 19 July 1920, *Pease & Long 22350* (G).

NEW BRUNSWICK: Nepisiguit, 30 July 1873, *Fowler* (MBG); alluvium of Nashwaak River, Nashwaak, 31 July 1922, *Fernald & Pease 25247* (G).

QUEBEC: La Trappe, 5 Aug. 1926, *Louis-Marie 141* (G); swamp, Ascot, Sherbrooke

Co., 20 July 1923, *Knowlton* (G); sand-plains, northwest of Three Rivers, 1 Aug. 1923, *Chamberlain & Knowlton* (G).

ONTARIO: Ashdod, 24 July 1893, *Fowler* (MBG); Kingston, Sept. 1897, *Fowler* (G); Aylmer, 5 Aug. 1912, *Fisher* (MBG).

MAINE: gravelly shore of St. John River, St. Francis, 5 Aug. 1893, *Fernald* (G); Foxcroft, 18 July 1895, *Fernald 296* (G, MBG); North Berwick, 28 Aug. 1891, *Parlin* (G); Eliot, 27 Aug. 1895, *Williams* (G).

NEW HAMPSHIRE: bank of "Connt" [Connecticut] River, 1894, *Jesup* (G); Success, Coos Co., 24 Aug. 1908, *Moore 4316* (G); roadside, Walpole, 28 July 1901, *Williams* (G); roadside, East Jaffrey, 10 July 1897, *Robinson 196* (G).

VERMONT: Weybridge, 8 July 1908, *Williams* (G); fields, Brandon, 7 July 1921, *Dutton* (MBG); Mechanicsville, 6 Aug. 1906, *I. W. Anderson* (G); Manchester, 6 July 1898, *Day 149* (G); Brattleboro, 2 Aug. 1898, *Robinson 153* (G).

MASSACHUSETTS: by Merrimac River, Lowell, 8 Aug. 1927, *Beattie* (P); Melrose, 17 July 1876, *Morong* (MBG); Waverly, 10 Aug. 1878, *Lane* (G); South Framingham, 11 Aug. 1888, *Sturtevant* (MBG); Jamaica Plain, *Faxon* (G); Wigwam Pond, Dedham, 6 Oct. 1901, *Williams* (G): Nine Mile Pond, Cape Cod, 4 Sept. 1898, *Greenman 398* (G, MBG); shore of Wequawket Pond, Centreville, 6 Sept. 1896, *Williams* (G); Centreville, 20 Aug. 1902, *Cheney* (G); Nonquit, 29 Aug. 1888, *Sturtevant* (MBG); Fisher's Pond, West Tisbury, Martha's Vineyard, 4 Sept. 1917, *Seymour 1324* (G); Monson, July 1897, *Morris* (MBG); near Water Shop Pond, Springfield, 5 Aug. 1924, *Seymour 511* (MBG); South Worthington, Hampshire Co., 17 Aug. 1912, *Robinson 572* (G).

RHODE ISLAND: Providence, *Olney* (G); Providence, 16 July 1892, *Collins* (G); dense wet thickets at borders of sphagnous swamps southwest of Harbor Pond, Block Island, 19 Aug. 1913, *Fernald & Long 10263* (G).

CONNECTICUT: waste ground near river, Stafford, 9 July 1922, *Weatherby 5076* (MBG); Southington, 10 Aug. 1897, *Bissell* (MBG); Southington, 31 July 1898, *Andrews* (G); Oxford, 11 Aug. 1888, *Harger* (G); New Haven, 1858, *Eaton* (MBG).

NEW YORK: Granville, 22 Aug. 1924, *Drushel 6351* (MBG); Port Chester, 3 Sept. 1886, *Stabler* (G); Willets Neck, Long Island, 8 Aug. 1853, *Hexamer & Maier* (G); Peconic, 15 Aug. 1895, *von Schrenk* (MBG); Fleischmanns, Delaware Co., 15 July 1892, *von Schrenk* (MBG); Dryden, 3 Sept. 1915, *Dean & Thomas 4874* (G); low flats north of the city, Ithaca, 16 July 1915, *MacDaniels 4873* (G); near Bool's Brook, Ithaca, *Munz 617* (P); Keene Valley, Essex Co., 1 Aug. 1891, *von Schrenk* (MBG); Canton, 17 July 1914, *Phelps 799* (G).

NEW JERSEY: Fort Lee, 30 July 1921, *Rydberg* (P); Plainfield, 9 Aug. 1877, *Trelease* (MBG); Watchung, 11 July 1930, *Moldenke 1339* (MBG); New Market, July 1892, *Kelsey 173* (G).

PENNSYLVANIA: banks of Susquehanna River at Perdix, 4 Aug. 1926, *Heller 14222* (MBG); near Harrisburg, 13 July 1888, *Small* (G); near Philadelphia, 1889, *Greenman 1273* (G); shores of Schuylkill River, Fairmount Park, 22 July 1871, *Redfield* (MBG).

DELAWARE: along Delaware River, south of Newcastle, 2 Aug. 1923, *Tidestrom 11551* (G).

MARYLAND: below Havre de Grace Park, 2 Aug. 1902, *Shull 156* (MBG); Ellicott City, 3 Aug. 1916, *Arsène 672* (MBG).

DISTRICT OF COLUMBIA: near Long Bridge, Washington, 11 July 1891, *Blanchard* (MBG).

VIRGINIA: Langley, 10 Aug. 1901, *W. Palmer* (US); South Fork, Holston River, at St. Clair's Bottom, Smyth Co., 30 July 1892, *Small* (G, MBG).

FLORIDA: Apalachicola, *Chapman* (MBG).

OHIO: dry places, July, *Riehl* (MBG); alluvial soil, Windham Township, Portage Co., 12 Aug. 1924, *Webb 5441* (G); Shaker Pond near Cleveland, 8 July 1896, *Greenman 1379* (G, MBG); near Cleveland, *Greenman 1377, 1382* (MBG).

WEST VIRGINIA: near Tygart Junction, 24 Sept. 1914, *Moore 2569* (G, P); Marlinton, 29 July 1930, *Berkley 1304* (MBG); Woods Co., 7 Aug. 1897, *Pollock* (MBG).

MICHIGAN: meadow, Turin, 9 July 1901, *Barlow* (G); thickets along West Maple River, west of Pellston, 7 Aug. 1917, *Gates 10708* (MBG); near Trenton, 13 Aug. 1914, *Chandler* (US); Agricultural College, 1890, *Baker* (P); South Haven, 4 Sept. 1911, *Lansing 3340* (G); Benton Harbor, 4 July 1911, *Lansing 3241* (G); New Buffalo, 20 July 1911, *Lansing* (G).

INDIANA: open woods, East Chicago, 10 Aug. 1910, *Lansing 2805* (G).

TENNESSEE: Hollow Rock, 5 Aug. 1897, *Eggert* (MBG); along railroads, McNairy Co., July 1893, *Bain 444* (G).

WISCONSIN: along Wolf River, near Keshena, 13 Sept. 1925, *E. J. Palmer 28738* (MBG); St. Croix Falls, Polk Co., July 1899, *Baker* (P); near Beef Slough, Buffalo Co., 13 Aug. 1926, *Fassett & Hotchkiss 3322* (G); near Mirror Lake, Sauk Co., July 1903, *Eggert* (MBG).

ILLINOIS: meadow, State Street, Chicago, 4 Aug. 1907, *Greenman 1953* (MBG); old beaches, Lake Chicago, Chicago, 5 Sept. 1909, *Steele 106* (MBG); waste ground, 39th and Stoney Island, Chicago, 12 July 1913, *H. H. Smith 5654* (G); west of Kankakee, 3 Aug. 1912, *Sherff 1649* (MBG); waste land, Champaign, 31 July 1900, *Gleason 1945* (G); Beardstown, July 1842, *Geyer* (MBG); Mississippi bottoms, Shepherd, Pike Co., 29 Aug. 1914, *Davis 3565* (MBG); banks of the Mississippi, opposite St. Louis, July 1842, *Engelmann* (MBG).

MINNESOTA: shore, De Soto Lake, Itaska Park, Becker Co., 13 Aug. 1929, *Grant 3073* (G, MBG); fields, Collegeville, 29 July 1912, *Chandonnet* (MBG); Rockville, July 1896, *Campbell* (P); Swan Lake, Minneapolis, July 1892, *Ballard* (G).

IOWA: Ames, Sept. 1873, *Bessey* (G); Ames, Sept. 1909, *Pammel 78* (MBG); ledges, Boone Co., 1898, *Pammel 1806* (MBG); Grinnell, Aug. 1875, *Jones* (P); Grinnell, Aug. 1877, *Jones* (G, MBG); Decatur Co., 13 July 1903, *Anderson* (MBG).

MISSOURI: Medill, 24 Aug. 1920, *Bush 9165* (MBG, P); Palmyra, 5 Oct. 1914, *Davis 3578, 3590* (MBG); Oakwood, *Davis 3192, 3817* (MBG); St. Louis Co., 12 Aug. 1877, *Eggert* (MBG, P); Creve Coeur Lake, 14 Aug. 1927, *Kellogg 1131* (MBG); St. Louis, July 1839, *Lindheimer* (MBG); banks of Chouteau's Pond, St. Louis, Aug. 1841, *Engelmann* (MBG); south banks of Chouteau's Pond, St. Louis, July 1842, *Engelmann 337* (MBG); banks of River des Peres, near St. Louis, Sept. 1841, *Engelmann* (MBG); St. Louis, Aug. 1861, *Engelmann* (G); Allenton, 18 June 1896, *Kellogg* (MBG); Courtney, 31 Aug. 1904, *Bush 2214* (MBG); Webb City, *E. J. Palmer 197, 198, 1085* (MBG); Neck City, 4 Aug. 1916, *E. J. Palmer 10568* (MBG); Joplin, 10 July 1897, *Trelease 716* (MBG).

MANITOBA: low ground, Muskeg Island, Lake Winnipeg, 11 Aug. 1884, *Macoun* (G).

NORTH DAKOTA: peninsula of Lake Ibsen, 1 Aug. 1899, *Lunell* (G); Grand Forks, 10 July 1893, *Brannon 128* (MBG); edge of slough, Fairmount, 22 July 1912, *Bergman 2335* (MBG).

SOUTH DAKOTA: Brookings, 1 Aug. 1893, *Thornber* (MBG); Oakwood Lakes, Brookings Co., 27 July 1903, *Johnson* (MBG); Iroquois, 9 Aug. 1894, *Thornber* (G); Forestburg, 18 July 1910, *Visher 4439* (MBG).

NEBRASKA: Dickson's Bluffs on the Missouri, 12 July 1853, *Hayden* (MBG);

prairies, Middle Loup River, near Thedford, 8 Sept. 1893, *Rydberg 1515* (G); St. Paul, 24 July 1909, *Bates* (G); Lincoln, 9 July 1885, *Webber* (MBG); waste places, Nuckolls Co., Aug. 1899, *Hedgcock* (MBG).

KANSAS: Olathe, Aug. 1892, *Hitchcock* (MBG); wet places, Riley Co., 16 July 1895, *Norton 390* (G, MBG); banks of Joy Creek, about 8 km. from Osborne City, 11 July 1894, *Shear 202* (G); Reno Co., 24 July 1899, *White 174* (MBG).

OKLAHOMA: near Lamont, 2 Aug. 1913, *Stevens 1791* (G, MBG); Doby Springs, Harper Co., 20 Aug. 1927, *Stratton 400* (MBG); close to edge of Lake Ivanhoe, near Shattuck, 11 Oct. 1913, *Stevens 2901* (G).

TEXAS: 1.6 km. north of Canadian River, on Amarillo-Dalhart Road, Oldham Co., 27 Aug. 1921, *Ferris & Duncan 3513* (MBG).

SASKATCHEWAN: without locality, 1857–8, *Bourgeau* (G).

MONTANA: Hot Springs, Flathead Lake, 8 Sept. 1908, *Jones 8963* (P).

WYOMING: Goose Creek, 10 July 1896, *A. Nelson 2258* (G, MBG); Sheridan, 24 July 1901, *A. Nelson 8439* (MBG).

COLORADO: Wray, 11–13 Aug. 1919, *Eggleston 15551* (P); Timnath, 22 July 1901, *Osterhout* (P); Fort Collins, 7 July 1897, *Crandall 2014* (G); along Platte River, Denver, 16 Aug. 1910, *Eastwood 41* (G, MBG); foothills near Golden, 1 Aug. 1878, *Jones 523* (P); Brighton, Sept.–Oct. 1908, *E. L. Johnston 507* (MBG); Georgetown, 24 July 1878, *Jones* (P); Canon City, 1872, *Brandegee* (MBG).

NEW MEXICO: valley of the Mimbres, 1851, *Wright 1498* (ANSP, G).

ARIZONA: Flagstaff, 1891, *MacDougal 566* (NY); Hassayampa Creek, Fort Whipple, 6 June 1865, *Coues & Palmer 279* (MBG).

IDAHO: Boise, 18 Aug. 1911, *Clark 253* (G, MBG); Falk's Store, Canyon Co., 28 June 1910, *Macbride 304* (MBG).

UTAH, Salt Lake City, 18 June 1878, *Jones 487* (P); near Salt Lake City, 14 July 1902, *Pammel & Blackwood 3638* (G); American Fork Canyon, 3 Aug. 1880, *Jones 1487* (P).

NEVADA: Panaca, 5 Sept. 1912, *Jones* (P).

BRITISH COLUMBIA: Alberni, Vancouver Island, July 1915, *Carter* (G).

WASHINGTON: Meyers Falls, 20 Aug. 1902, *Kreager 469* (G); Alma, Okanogan Co., July 1897, *Elmer 537* (MBG, P); foot of Priest Rapids, 17 July 1903, *Cotton 1396* (G); Yakima region, 1882, *Brandegee* (MBG); Walla Walla, July 1898, *Savage, Cameron & Lenocker* (MBG); Prosser, 14 July 1929, *Gotfredson 90* (P).

OREGON: near Pendleton, 11 Sept. 1896, *Leiberg 2630* (G); Multnomah Co., July 1877, *T. Howell 292* (G); Mount Scott, Multnomah Co., 15 Aug. 1902, *Sheldon 11167* (G, MBG, P); low ground, Salem, 30 July 1917, *J. C. Nelson 1804* (G).

CALIFORNIA: near San Joaquin River, Louis Park, Stockton, 26 Sept. 1927, *Stanford 721* (P).

This rather distinct species shows a tendency to blend with several members of the *Verbenaca* in the region of the Middle States. Some botanists have regarded the variability in the compactness and the profusion of the inflorescence, as well as the tendency of the leaves to develop hastate lobes near the base, as being of nomenclatorial value. Unfortunately in the rather complete series of specimens at hand, the writer has not found any combination of characters varying greatly in one direction;

and, at the present time, sees no reason to maintain other than the specific category.

17. V. simplex Lehm. Ind. Sem. Hort. Hamb. 17. 1825; in Nova Acta K. Acad. Leop. (Pugill. Pl. 1: 37) **14:** 824. 1828; Linnaea **3:** Litt.-Ber. 10. 1828.

V. angustifolia Michx. Fl. Bor.-Am. **2:** 14. 1803, not *V. angustifolia* Mill. Gard. Dict. no. 15. 1768.

V. rugosa Muhl. ex Willd. Enum. Hort. Berol. 633. 1809, not *V. rugosa* Mill. Gard. Dict. no. 18. 1768, nor *V. rugosa* D. Don in Sweet, Brit. Fl. Gard. II. **4:** *pl. 318.* 1838.

Stems chiefly erect, branched above, branches ascending, sparsely pubescent or strigillose; leaves lanceolate or spathulate, tapering into a subsessile base, 3–10 cm. long, subacute or obtusish, serrate or serrulate, reticulately rugose above and occasionally scabrous, somewhat prominently veined beneath, glabrate or sparsely strigillose on both surfaces; spikes solitary at the apices of stems and branches, short-peduncled, strict, usually somewhat crowded; bracts lanceolate-subulate, commonly shorter than the calyx, glabrate or glabrous; fruiting calyx 4 (–5) mm. long, sparsely pubescent, lobes acuminate; corolla-tube scarcely longer than the calyx, with scattering hairs outside the throat; corolla-limb about 6 mm. broad; nutlets trigonous, 2.5 mm. long, raised-reticulate above, striate toward base; commissural faces fully as long as the nutlets, muriculate-scabrous.

Distribution: Ontario and Vermont, south to Florida, west to Oklahoma and Nebraska.

Specimens examined:

ONTARIO: rocky ground, Belleville, 20 June 1876, *Macoun 1305* (G).

VERMONT: without locality, 5 July 1903, *Blanchard 26, 60* (G), *161* (NY).

MASSACHUSETTS: dry hillside, Sheffield, 27 Aug. 1902, *Hoffman* (G).

CONNECTICUT: railroad cut, Fair Haven, 18 June 1886, *Harger* (G); New Haven, *Eaton* (G); New Haven, 26 June 1884, *Safford 216* (US).

NEW YORK: sandy field north of Tripoli, 25 July 1920, *Burnham* (G); Pine Plains, 1875, *Hoyeradt* (G).

NEW JERSEY: Scotch Plains, 13 Aug. 1877, *Trelease* (MBG); Camden Co., 22 June 1871, *Parker* (G); Atco, 22 June 1871, *Redfield 6430* (MBG); Sicklerville, 21 June 1894, *Brinton* (G); Oakland, 25 July 1909, *Mackenzie 4213* (MBG).

PENNSYLVANIA: without data, *Muehlenberg* (Bot. Mus. Berl.-Dahl. TYPE of *V. rugosa*, MBG phot.); Philadelphia, *Nuttall* (G); Whiteland, Chester Co., 26 June 1910, *Bartram 1021* (G); vicinity of Conewago, 28 May 1889, *Small* (US); York Furnace, 28 June 1899, *MacElwee 760* (MBG, NY); Mercersburg, *Green* (G).

MARYLAND: Great Falls, 6 Aug. 1905, *House 1363* (MBG); Hurlock, 29 May 1919, *C. P. Smith 3186* (G).

DISTRICT OF COLUMBIA: Washington, 26 May 1889, *Sudworth* (G); Joy City, 19 June 1891, *Blanchard* (MBG).

VIRGINIA: Bluemont, 25 May 1905, *House 875* (US); open woods near Churchview, 5 June 1921, *Leonard & Killip 534* (US); north of Williamsburg, 17 June 1921, *Grimes 3738* (NY); Bedford Co., June 1873, *Curtiss* (MBG); Chilhowie, 4 Aug. 1892, *Small* (F, NY); about Cumberland Gap, Lee Co., 27 July 1892, *Small* (F, G, MBG, US); Blue Ridge, 22 July 1891, *Seymour 48* (G), *49* (MBG).

NORTH CAROLINA: near Chapel Hill, *Ashe* (US); Morgantown, 1872, *Ruger* (US); near Biltmore, 17 June 1897, *Biltmore Herbarium 4759b* (G, NY, US); Madison Co., 27 July 1880, *J. D. Smith* (US).

SOUTH CAROLINA: Abbeville District, July 1855, *Hexamer & Maier* (G).

GEORGIA: Dalton, 9 Aug. 1900, *Harper 385* (NY, US); Chickamauga Creek, near Ringgold, 6–12 Aug. 1895, *Small* (F, NY); between Taylor Ridge and Lafayette, 3 July 1900, *P. Wilson 161* (NY, US).

FLORIDA: without locality, 1842–49, *Rugel 127* (F, MBG, US).

ALABAMA: Cullman, 29 May 1892, *Mohr* (US); Blount Springs, 5 May 1898, *Baker* (P); Blountsville, 6 May 1898, *Baker* (US); Choctaw Co., 13–15 Oct. 1896, *Schuchert* (US).

MISSISSIPPI: Agricultural College, Oktibbeha Co., 11–17 Aug. 1896, *Pollard 1312* (F, G, MBG, NY, P, US).

OHIO: on limestone soil, Castalia, 27 July 1894, *Moseley* (G); Sandusky, 28 July 1894, *Moseley* (F, US); Oxford, 16 June 1910, *Overholts* (MBG).

WEST VIRGINIA: Shenandoah Junction, June 1891, *Millspaugh 865* (NY); along Roanoke River, south of Roanoke, 2 June 1891, *Small & Heller 432* (G); roadside, south of Williamsburg, 13 June 1921, *Grimes 3716* (G); Sweet Springs, 14 Sept. 1903, *Steele 314* (G, MBG, NY, US).

INDIANA: near boundary line to Galien, St. Joseph Co., 15 June 1911, *Nieuwland 2685* (MBG, US); about 3 km. west of Goldsmith, 9 July 1913, *Deam 13619* (MBG); about 1.6 km. west of Palmyra, 22 June 1916, *Deam 20357* (G, US).

KENTUCKY: without data, *Short* (NY); Stamping Ground, 29 May 1930, *Singer 178* (US); Smithfield, 30 May 1909, *Eggleston* (NY); Nicholasville, 8 June 1923, *McFarland 109* (MBG); Mammoth Cave, Edmonson Co., May 1899, *Palmer* (NY); Bowling Green, 21 May 1899, *Price* (MBG); near Franklin, 22 May 1926, *Anderson & Woodson 47* (MBG); Kuttawa, 27 Sept.–9 Oct. 1909, *Eggleston 5237* (MBG, NY).

TENNESSEE: Carter Co., 8 July 1880, *J. D. Smith* (US); Knoxville, *Ruth* (F, P), *731* (US), *740* (NY), *765* (MBG); roadside at base of Chilhowee Mountains, *Curtiss 1955* (F, G, MBG, NY); Chattanooga, 25 Aug. 1876, *Engelmann* (MBG); West Nashville, 26–27 May 1909, *Eggleston 4430* (MBG, NY, US); Kingston Spring, 5 Aug. 1897, *Eggert* (MBG); Hollow Rock, Carroll Co., 14 Aug. 1897, *Biltmore Herbarium 4759* (G, MBG, NY, US).

WISCONSIN: Baraboo, 1861, *Hale* (G, MBG).

ILLINOIS: Stony Island, June 1911, *Greenman 3640* (MBG); Stony Island, 25 June 1914, *H. H. Smith 5923* (G, MBG); near 91st Street, Chicago, 28 July 1907, *Greenman 1981* (MBG); South Chicago, 18 July 1913, *H. H. Smith 5670* (G); Rock Island, 17 Aug. 1866, *Engelmann* (MBG); East St. Louis, 9 July 1898, *Norton* (MBG); bluffs near Prairie du Pont, 20 June 1876, *Eggert* (MBG); Red Bud, 3 June 1888, *Pammel* (MBG); Shawneetown, 26 May 1919, *E. J. Palmer 15262* (MBG); Mound City, June 1859, *Vasey* (G).

IOWA: without locality, 17 July 1875, *Arthur 24* (MBG); Cedar Falls, 12 July 1926, *Pammel 272* (G); Iowa City, *Hitchcock* (MBG); Columbus Junction, 27 Aug. 1899, *Pammel 1699* (MBG).

MISSOURI: Hannibal, 27 June 1917, *Davis 3588* (MBG); Ethel, 11 June 1915, *Bush 7586a* (MBG); Silex, 29 May 1915, *Davis 4552* (MBG); prairie, St. Louis, May 1833, *Engelmann 336* (MBG); banks of Mississippi above St. Louis, Oct. 1841, *Engelmann* (MBG); St. Louis, Sept. 1841, *Engelmann* (G, US); mineral region southwest of St. Louis, June 1845, *King* (MBG); Pacific, 13 June 1897, *Trelease 713* (MBG); Pacific, 3 June 1918, *Greenman 4125* (MBG); Gray Summit, 16 June 1927, *Kellogg 1130* (MBG); Allenton, 6 July 1911, *Letterman* (MBG); near Sulphur Springs, 29 May 1927, *Steyermark 292* (MBG); Crystal City, 14 May 1887, *Trelease* (MBG); Washington, 25 June 1888, *Pammel* (MBG); Victoria, 8 July 1890, *Hitchcock* (MBG); Jefferson Co., 20 June 1876, *Eggert* (MBG); near Hillsboro, June, *Riehl 456* (MBG); Hillsboro, 24 May 1885, *F. Wislizenus 280* (MBG); near St. Genevieve, 27 May 1928, *Greenman 4578* (MBG); Jerome, 24 May 1914, *Kellogg 496* (MBG); Sheffield, 17 June 1915, *Bush 7647* (G, MBG, US); Westport, 17 May 1896, *Bush 914* (US); Independence, 1 June 1895, *Tindall* (MBG); south of Cedar Gap, 22 May–3 June 1911, *Lansing 2976* (F, G); about 2 km. west of Mansfield, 5–12 June 1911, *Lansing 3135* (F, G); Springfield, 31 July 1892, *Dewart 42* (MBG); Willard, 24 July 1919, *Blankinship* (P); limestone barrens, Ash Grove, 24 Aug. 1912, *Standley 9336* (US); Carterville, 8 July 1910, *E. J. Palmer 2981* (MBG); Webb City, *E. J. Palmer 200, 3319* (MBG); Swan, 24 Sept. 1899, *Bush 450* (MBG); Galena, Stone Co., 27 May 1914, *E. J. Palmer 5769* (MBG); Gainesville, 26 June 1928, *E. J. Palmer 34766* (MBG); Eagle Rock, 24 June 1897, *Bush 206* (MBG, US); Noel, McDonald Co., 9 Sept. 1913, *E. J. Palmer 4232* (MBG).

ARKANSAS: Beaver Station, Eureka Springs, *Glatfelter* (MBG).

NEBRASKA: Wahoo, June 1890, *Rydberg 154* (NY).

KANSAS: Lawrence, *Stevens* (US); between Pleasanton and Prescott, 20 June 1929, *Rydberg & Imler 120* (MBG); sterile soil, Anderson Co., 1896, *Hitchcock 791* (G, MBG, NY, US); Mound City, 18 July 1887, *Kellerman* (MBG).

OKLAHOMA: near Miami, 26 Aug. 1913, *Stevens 2299* (G, NY); near Copan, 15 Aug. 1913, *Stevens 2080* (G); Foyil, 5 Aug. 1894, *Bush 433* (MBG); on creek bank, near Pawhuska, 9 Aug. 1913, *Stevens 1980* (G); Caddo, 20 June 1891, *Sheldon 49* (US); near Idabel, 18 May 1916, *Houghton 3622, 3646* (G, MBG).

This species appears to be very closely related to *V. hastata*. In its typical form, it is readily distinguished by its elongate spikes and narrow leaves. Often, however, intermediate forms occur between the two, making it somewhat difficult to find clear lines of demarcation between them.

18. V. Orcuttiana Perry,[18] n. sp.

[18] **V. Orcuttiana** Perry, spec. nov., herbacea verisimiliter perennis; caulibus erectis quadrangularibus sparse pubescentibus ramosis; foliis lanceolato-ellipticis spathulatisve in petiolum alatum attenuatis 4–6 cm. longis grosse serratis lineato-rugosis adpresso-pubescentibus supra subtusque reticulatis dense patento-hirtellis; spicis pedunculatis compactis elongatisque; bracteis lanceolato-acuminatis sparse ciliatis nervo medio et margine decurrentibus calyce brevioribus; calyce 4 mm. longo

Stems several from a common base, 4-angled in cross-section, glabrous or very sparsely hirtellous, branching; leaves lanceolate-elliptical to spathulate, tapering into a margined petiole (1–2 cm. long), 4–6 cm. long, decussate, coarsely serrate, rugose and appressed-pubescent above, more densely spreading-pubescent or hirtellous beneath and prominently veined; spikes pedunculate, solitary or somewhat panicled, strict, mostly dense, elongate; rhachis more or less angulate; bracts lanceolate-acuminate, shorter than the calyx, midrib and margins more or less decurrent along the rhachis, sparsely ciliate; calyx 4 mm. long, appressed-pubescent and finely glandular, teeth short-subulate or acuminate, more or less connivent above the schizocarp; corolla-tube about as long as the calyx; corolla-limb 3–4 mm. broad; nutlets trigonous, 2 mm. long, raised-reticulate at the apex, striate toward the base; commissural faces extending to the tip of the nutlet, muriculate-scabrous.

Distribution: Lower California.

Specimens examined:

MEXICO:

LOWER CALIFORNIA: Pinery, 27 July 1883, *Orcutt* (US); Hanson's Ranch, 29 July 1883, *Orcutt* (G, NY, US); table-lands, Hanson's Ranch, 30 July 1883, *Orcutt 909* (G TYPE); mountains, northern Lower California, 8 July 1885, *Orcutt* (US); Sierra Juarez, 12 July 1924, *Gallegos 2342* (US).

This species, which has been passing as *V. litoralis*, is much like *V. neomexicana* var. *xylopoda* in the finely glandular spike and the angle of insertion of the flowers. It differs, however, in the shorter nutlets, the smaller corollas, and the type of the pubescence. In *V. Orcuttiana*, the trichomes are short and somewhat hirtellous and the pubescence of the inflorescence is closely appressed. In gross habit, it is scarcely to be distinguished from *V. simplex*, but the latter has somewhat harsher pubescence and larger non-glandular flowers.

19. V. stricta Vent. Hort. Cels. 53, *pl. 53*. 1800.
V. Alopecurus Cav. Descr. 68. 1802.

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adpresso-pubescente tenuiter glanduloso; calycis dentibus breviter subulatis vel acuminatis; corollae tubo vix exserto; corollae limbo 3–4 mm. lato; coccis subtrigonis 2 mm. longis dorso striatis apice elevato-reticulatis; commissura muriculata.—Collected on table-lands, Hanson's Ranch, Lower California, 30 July 1883, *Orcutt 909* (G), TYPE.

V. rigens Michx. Fl. Bor.-Am. **2**: 14. 1803.
V. cuneifolia Raf. Med. Repos. N. Y. II. **5**: 360. 1808.
V. stricta β ? *mollis* Torr. Ann. Lyc. N. Y. **2**: 234. 1827.
V. mollis Raf. Atl. Jour. 146. 1832.
V. stricta f. *roseiflora* Benke, Rhodora **34**: 10. 1932.
V. stricta f. *albiflora* Wadmond, Rhodora **34**: 19. 1932.

Stems 3–12 dm. tall, subterete, simple or branched above, rather densely hirsute; leaves ovate or suborbicular, 6–10 cm. long, sessile or nearly so, sharply and mostly biserrate, thickish, hirsute and rugose above, densely hirsute-villous and prominently veined beneath; spikes solitary or several, short-pedunculate, thick, usually quite dense both in flower and in fruit; bracts lanceolate-subulate, approximately as long as the calyx, hirsute, ciliate; calyx 4–5 mm. long, densely hirsute, lobes acuminate; corolla protruding slightly beyond the calyx, pubescent without; corolla-limb 8–9 mm. broad; nutlets trigonous, 2.5 mm. long, raised-reticulate above, strongly striate below; commissural faces reaching tip of nutlet, muriculate or almost smooth.

Distribution: eastern and central United States, from Pennsylvania westward through the Rocky Mountains. Probably introduced into other localities.

Specimens examined:

(Herb. Bot. Gard. Madrid TYPE of *V. Alopecurus*, MBG phot.).

MASSACHUSETTS: Fall River, 2 Sept. 1903, *Sanford* (G).

CONNECTICUT: waste ground, Nangatuck, 19 July 1908, *Blewitt 14* (G); Bridgeport, 27 Aug. 1892, *Eames* (G).

NEW YORK: pasture south of Pulpit Rock, Ithaca, 2 Aug. 1919, *A. J. Eames 12797* (G).

NEW JERSEY: ballast, New Durham, 15 July 1893, *Van Sickle* (US).

PENNSYLVANIA: along Lincoln Highway at Gap, Lancaster Co., *Urban* (G); vicinity of Conewago, Sept. 1892, *Small* (NY); Conewago, Sept. 1892, *Heller 638* (US).

OHIO: Dayton, *Short* (MBG).

MICHIGAN: Constantine, 2 July 1923, *Fisher 19* (MBG); Pine Lake, Charlevoix Co., 18 Aug. 1917, *Ehlers 642* (P).

INDIANA: East Chicago, 10 Aug. 1910, *Lansing 2810* (G); Lake Maximkuckee, 9 Aug. 1889, *Evermann 970* (US); sand pit northeast of Winona Lake, 2 Aug. 1897, *Deam* (MBG); west of Palmyra, 22 June 1916, *Deam 20357a* (G).

KENTUCKY: waste places, Hickman, 14 Aug. 1897, *Biltmore Herbarium 3653a* (NY); Calvert City, Marshall Co., 16–19 June 1909, *Eggleston 4837* (NY); Wickliffe, 16 Aug. 1923, *McFarland & Anderson 253* (MBG).

TENNESSEE: Hickmann, *Gattinger* (US); Henderson, June 1892, *Bain 328* (NY).

WISCONSIN: Mirror Lake, 15 July 1903, *Eggert* (MBG); Waupaca, 1907, *Garesche* (MBG); Trempeleau, 1861, *Hale* (G); Oregon road, Madison, 29 July 1889, *Trelease* (MBG).

Illinois: Stony Island, Chicago, *H. H. Smith 5645, 6028* (G, MBG), *5952* (G); Romeo, 26 July 1897, *Umbach* (MBG); Starved Rock, La Salle Co., June–Sept. 1921, *Thone 88* (MBG); Oquawka, 1872, *Patterson* (G, NY); Bloomington, July 1886, *Robinson* (G); Carthage Township, 2 Sept. 1916, *Gates 9994* (MBG); Decatur, 19 June 1896, *Gleason 377* (G); Athens, Aug. 1863, *Hall* (MBG); East Hannibal, 13 June 1913, *Davis 16* (MBG); Shepherd, 25 June 1915, *Davis 6370* (MBG); Mississippi River, bluffs north of Alton, 4 Aug. 1910, *Sherff* (G); Bonpas Township, 15 July 1925, *Ridgway 2431* (MBG); E. St. Louis, 28 July 1900, *Eggert* (MBG); Grand Tower, 22 Aug. 1900, *Gleason* (G).

Minnesota: Perham, Ottertail Co., 8 Aug. 1912, *Chandonnet* (MBG); St. Anthony, 7 July 1888, *Schuette* (G, NY); Willmar, July 1892, *Frost* (G); Morton, July 1890, *MacMillan* (P); Lake City, 28 July 1883, *Manning* (G); Winona Co., Aug. 1901, *Holzinger* (NY); Houston Co., July 1912, *Freiberg* (MBG).

Iowa: Fayette Co., 12 July–4 Sept. 1904, *Fink 251* (US); Hawkeye, Aug. 1896, *Gardner 583* (NY); Cerro Gordo Co., 14 Aug. 1899, *Jones* (MBG); Ames, 29 Aug. 1896, *Pammel 85* (G, MBG, NY); Grinnell, Aug. 1877, *Jones* (NY, P); Mount Pleasant, 7 July 1898, *Ball 1585* (MBG); Keosauqua, Aug. 1920, *Graves 1947* (MBG); Bentonsport, July 1920, *Graves 1994* (MBG).

Missouri: suburbs of Hannibal, *Davis 1202, 1513, 2791, 2960, 2962, 3227, 3589, 4461, 4487* (all MBG); Chain of Rocks, Aug. 1915, *Beckwith 48* (MBG); St. Louis Co., 15 July 1872, *Redfield 522* (MBG); St. Louis, Aug. 1838, *Riehl 196* (MBG, NY); St. Louis, Aug. 1841, *Engelmann* (G); Allenton, *Letterman* (MBG); Williamsville, Wayne Co., 27 June 1914, *E. J. Palmer 6107* (MBG); Jerome, 16 June 1914, *Kellogg 498* (MBG); Warsaw to Linn Creek, Camden Co., July–Aug. 1913, *Emig 107* (MBG); Cole Camp, Benton Co., 12 July 1897, *Trelease 717* (MBG); railroad embankments, Mansfield, 5–12 June 1911, *Lansing 3164* (G); Randolph, 17 July 1898, *Mackenzie 261* (MBG); Independence, 26 June 1895, *Bush 475* (MBG, NY); Willard, 9 July 1919, *Blankinship* (P); Carterville, 8 July 1910, *E. J. Palmer 2980* (MBG); Webb City, 3 Aug. 1902, *E. J. Palmer 199* (MBG); Turkey Creek, Joplin, 10 July 1897, *Trelease 718* (MBG); Swan, 25 Sept. 1899, *Bush 570* (MBG).

Arkansas: waste places, *Harvey 1958* (G, NY); Big Lake, 20–22 June 1911, *McAtee 2053* (NY, US); Jonesboro, Craighead Co., 4 July 1927, *Demaree 3553* (MBG); Fayetteville, *Harvey 61* (MBG); Fort Smith, 1853–4, *Bigelow* (US).

South Dakota: Big Stone Lake, Roberts Co., July 1922, *Over 14386* (US); Windsor Township, Brookings Co., 27 July 1903, *Johnson* (MBG); Forestburg, 3 July 1910, *Visher 4450* (MBG); 16 km. south of Interior, 29 June 1929, *E. J. Palmer 37627* (G, MBG); near Fort Meade, Black Hills, 19 June 1887, *Forwood 299* (US); canyons, Lead, 9 Aug. 1913, *Carr 118* (G, MBG, NY, US); Rapid City, 22 July 1912, *Visher 1507* (NY); Hot Springs, 3 Aug. 1892, *Rydberg 932* (US).

Nebraska: Lincoln, 27 June 1885, *Webber* (MBG); near Central City, 26 Aug. 1926, *Heller 14290* (MBG); South Fork of Platte, July 1856, *H. Engelmann* (G, MBG); Alma, 21 June 1897, *Pammel* (MBG); Anselmo, 8 July 1889, *Webber* (US); Broken Bow, 7 July 1897, *Pammel* (MBG); Callaway, 27 June 1901, *Bates* (G); Dismal River, south of Thedford, 27 June 1893, *Rydberg 1422* (G, NY, US); North Platte, July 1896, *Plank* (NY); Ogallala, 16 June 1925, *Jones* (P).

Kansas: Pottawatomie Co., 1895, *Hitchcock 972* (US); prairie, Riley Co., 26 July 1895, *Norton 391* (G, MBG, NY, US); Concordia, 24 July 1929, *Benke 5164* (G, NY), forma *roseiflora;* hill 8 km. from Osborne, 11 July 1894, *Shear 191* (G); Florence, 28–30 July 1903, *Griffiths 5050* (US); vicinity of Caney, 29 June 1929, *Rydberg & Imler 433* (MBG, NY); Syracuse, 28 July 1893, *C. H. Thompson 154* (G, MBG, NY, US).

OKLAHOMA: Verdigris, 2 Aug. 1894, *Bush 435* (MBG); 12 km. west of Pawnee, 27 July 1927, *Stratton 249* (MBG); near Tonkawa, 5 Aug. 1913, *Stevens 1865* (G); Doby Springs, 20 Aug. 1927, *Stratton 403* (MBG); near Shattuck, 11 Oct. 1913, *Stevens 2930* (G); Norman, 10 Oct. 1914, *Emig 365* (MBG); near Granite, 17 June 1913, *Stevens 1034* (G); Arbuckle Mountains near Davis, 23 June 1917, *Emig 787* (MBG); vicinity of Fort Sill, 16 Aug. 1916, *Clemens 11748* (MBG); near Cache, 25 June 1913, *Stevens 1354½* (G, MBG); near Grant, 2 June 1916, *Houghton 4000* (G, MBG, NY).

TEXAS: Lipscomb, 1 July 1903, *Howell 64* (US); prairies, near Canadian, 11 Aug. 1900, *Eggert* (MBG); Dallas, *Reverchon* (G, NY), *735* (MBG).

MONTANA: bottoms, Crow Agency, 14 July 1901, *Blankinship* (G).

WYOMING: Whalen Canyon, 16 July 1894, *A. Nelson 538* (G); Hartville, 20 July 1894, *A. Nelson 505* (G, MBG).

COLORADO: Wray, 1–4 July 1919, *Eggleston 15224* (MBG); Denver, 2 Sept. 1910, *Eastwood 90* (G, MBG, US).

NEW MEXICO: creek bottom, Santa Fe, 1847, *Fendler 597* in part (ANSP, G).

WASHINGTON: Meyers Falls, 20 Aug. 1902, *Kreager 475* (G, NY, US).

A very distinct species somewhat incapable of sharp delimitation on account of the tendency to hybridize with neighboring species. Normally it is recognized by its stout compact spike, imbricated flowers, and ovate-orbicular sessile leaves.

20. V. MacDougalii Heller, Bull. Torr. Bot. Club **26:** 588. 1899.

V. MacDougalii mut. *rosella* Cockerell, Am. Nat. **36:** 809. 1902.

Stems 3–8 dm. tall, stout, obtusely four-angled, simple or occasionally branched, cinereous-green, hirsute-pubescent; leaves oblong-elliptical or elongate-ovate, 6–10 cm. long, short-petiolate or narrowed into a subpetiolar base, coarsely and irregularly serrate-dentate, hirtellous, rugose and minutely pustulate above, densely pilose-pubescent and prominently veined beneath; spikes solitary or sometimes several, short-pedunculate, thick, comparatively dense both in flower and in fruit; bracts lanceolate-subulate, for the most part noticeably longer than the calyx, pubescent, ciliate; calyx 4–5 mm. long, rather densely pubescent, lobes very obtuse, terminating in short subulate teeth; corolla-tube scarcely protruding beyond the calyx; corolla-limb 6 mm. broad; nutlets trigonous with convex back, 2.5 mm. long, raised-reticulate toward the distal end, strongly or faintly striate below; commissural faces reaching tip of nutlet, muriculate or almost smooth.

Distribution: southern Wyoming to New Mexico and Arizona.

Specimens examined:

WYOMING: Platte Canyon, Laramie Co., 2 July 1901, *A. Nelson 8354* (MBG).

COLORADO: Palmer Lake, 22 July 1895, *Osterhout* (NY); La Veta, 14 July 1896, *Shear 3577* (NY); Cucharas Valley, near La Veta, 20 July 1900, *Vreeland 636* (NY); Stonewall, July 1912, *Beckwith 138* (NY); Arboles, 10 July 1899, *Baker 565* (F, G, MBG, NY, P, US).

NEW MEXICO: without locality, 1847, *Fendler 597* in part (MBG); Vermejo Park, Colfax Co., 31 Aug. 1913, *Wooton* (NY); vicinity of Ute Park, Colfax Co., 2 Sept. 1916, *Standley 14224* (NY); foot of Baldy Mountain, near Elizabethtown, Oct. 1898, *St. John* (US), mut. *rosella;* near Sierra Grande Union, 18 June 1911, *Standley 6065* (US); Jicarilla Apache Reservation, near Dulce, 20 Aug. 1911, *Standley 8239* (US); southeast of Cuba, 22 Aug. 1915, *Read 19* (US); Sandia Mountains, 15 July 1914, *Ellis 258* (MBG, US); Santa Fe Co., 10 July 1847, *Edwards* (NY); Santa Fe Co., 1889, *Brandegee* (MBG); Santa Fe Co., 20 July 1898, *Greene 77* (NY); Santa Fe Canyon, 3 Oct. 1913, *Rose, Fitch & Parkhurst 17717* (US); Winsar's Ranch, Pecos River National Forest, 6 July 1908, *Standley 4223* (F, G, MBG, NY, US); near Pecos, 15 Aug. 1908, *Standley 4927* (F, G, MBG, NY, US); west of Las Vegas, *St. John* (P); Las Vegas, 26 June 1893, *Mulford 39* (MBG); vicinity of Las Vegas, *Anect 57* (G), *211* (NY); mountains west of Grant's Station, 2 Aug. 1892, *Wooton* (NY, US); White Mountains, Lincoln Co., 26 July 1897, *Wooton 208* (MBG, NY, P, US); Cloudcroft, 1912, *Stearns 342, 358* (US); Cloudcroft, Aug. 1920, *Schulz 255* (NY); Mescalero Reservation, Sacramento Mountains, 21 July 1905, *Wooton* (US).

ARIZONA: Clark's Valley, 1 Aug. 1883, *Rusby* (NY, US); South Fork, Little Colorado River, Apache Forest, 23 Aug. 1920, *Eggleston 17106* (NY); 16 km. south of Rowe's Point on the Grand Canyon, 5 Nov. 1899, *Ward 11* (US); Flagstaff, 29 Aug. 1884, *Jones* (P); vicinity of Flagstaff, 8 July 1898, *MacDougal 249* (ANSP, F, G, NY TYPE); open pines, Flagstaff, 16 Aug. 1922, *Hanson A148* (F, MBG).

UTAH: Mammoth Creek, near head of Sevier River, 10 Sept. 1894, *Jones 6026* (MBG, NY, P).

This southwestern representative of *V. stricta* is readily distinguished by the short-petiolate elongated leaves, the compact spikes, and the floral bracts surpassing the calyx.

21. V. macrodonta Perry,[19] n. sp. Pl. 14.

[19] **V. macrodonta** Perry, spec. nov., herbacea (basi ignota) verisimiliter perennis; caule 1–1.5 m. alto erecto hirsuto-hispidulo ramoso; foliis elongato-ovatis basi cuneata in brevem petiolum alatum attenuatis 10–14 cm. longis biserratis vel mucronulato-denticulatis supra scabro-hirsutis et inconspicue pustulatis subtus reticulatis hirsutis; spicis paniculatis glanduloso-hirsutis basi foliolatis compactis deinde elongatis basi laxisque; bracteis lineari-lanceolatis subulatis ciliatis calyci subaequantibus; calyce 5 mm. longo glanduloso aliquantulum viscido-pubescente; calycis dentibus 1.5 mm. longis subulatis; corollae tubo paulo exserto extus glabro vel puberulo; corollae limbo 5–6 mm. lato; coccis subtrigonis 2 mm. longis dorso sulcatis superiore parte tenuiter scrobiculatis; commissura muriculata.—Collected on the road from Miraflores to San Bernardo Ranch in Sierra La Laguna, Lower California, about 750 m. alt., 20 Jan. 1906, *Nelson & Goldman 7425* (MBG), TYPE.

Stem 1–1.5 m. tall, erect, branching, hirsute-hispidulous; leaves elongate-ovate with cuneate base narrowed into a short (1–2 cm. long) margined petiole, 10–14 cm. long, coarsely and sharply biserrate-dentate with mucronate teeth, rugose with veins impressed and scabrous-hirsute above with minutely pustulate hairs, prominently veined and hirsute beneath; spikes panicled, subtended by leafy bracts, dense before anthesis, becoming elongated and open in fruit, glandular-hirsute; floral bracts lanceolate-linear, approximately equalling the fruiting calyx, subulate, ciliate; calyx 5 mm. long, glandular, somewhat viscid-pubescent, teeth 1.5 mm. long, subulate; corolla-tube protruding a little beyond the calyx, glabrous or puberulent without; corolla-limb 5–6 mm. broad; nutlets trigonous, 2 mm. long, shallowly scrobiculate on the upper half, tending to be sulcate toward the base; commissural faces muriculate.

Distribution: Lower California.

Specimens examined:

MEXICO: LOWER CALIFORNIA: road from Miraflores to San Bernardo Ranch in Sierra La Laguna, about 750 m. alt., 20 Jan. 1906, *Nelson & Goldman 7425* (MBG TYPE, US).

Verbena macrodonta is a coarse plant with large thickish leaves and open inflorescence, in a measure similar to *V. MacDougalii*, but differing in its less strict habit, somewhat remote fruits, more glandular calyces, and shorter plumper nutlets.

22. V. prostrata R. Br. in Ait. Hort. Kew. ed. 2, **4**: 41. 1812.

V. lasiostachys Link, Enum. Hort. Berol. **2**: 122. 1822.

Stems at first erect or ascending, at length spreading and diffusely branched, sparsely villous; leaves ovate or oblong-ovate with cuneate base tapering into a margined petiole, 5–10 cm. long, commonly 3-cleft, coarsely and irregularly serrate-dentate with apiculate teeth, or incised, veins impressed above, more or less conspicuous below, both surfaces pilose to sparsely villous; spikes solitary or more often loosely paniculate, dense before anthesis, becoming elongated and open in fruit; bracts lanceolate-subulate, not longer than the calyx, villous and at times finely glandular; calyx 4–5 mm. long, villous or glandular-hirsute, subtruncate, the distal end connivent above the schizocarp, teeth subulate; corolla-tube a little longer than the calyx, very

sparsely pubescent outside or apparently glabrous; corolla-limb 3–5 mm. broad; nutlets oblong-trigonous with convex back, 2–2.5 mm. long, slightly thicker at the distal end, raised-reticulate above, striate below, often with striae fading out toward the base; commissural faces more or less muricate, approximately reaching the tip of the nutlet.

Distribution: Oregon and California.

Specimens examined:

OREGON: dry bank along railroad, about 1.5 km. north of Comstock, 18 June 1919, *J. C. Nelson 2669* (G); banks of Umpqua at Roseberg, 2 June 1928, *Thompson 4412* (MBG); Glendale, 19 June 1902, *Jones* (P); Pleasant Creek, near Wimer, 26 July 1892, *Hammond 322* (MBG, NY, US); Grant's Pass, 24 June 1884, *T. Howell 174* (US); Grant's Pass, 3 July 1887, *T. Howell* (F), *1249* (MBG); gravel bar about 5 km. above mouth of Rogue River, 8 July 1919, *Peck 8702* (G, MBG, NY); in clearing about hotel, Agness, 22 June 1917, *J. C. Nelson 1429* (G); Dryden, 16 June 1904, *Piper 6160* (US); near Medford, Aug. 1922, *Epling 5445* (MBG); south of Ashland, 19 May 1898, *Applegate 2228* (US).

CALIFORNIA: near Yreka, Siskiyou, 19 June 1876, *Greene 860* (F, G, MBG, NY); Yreka, 2 July 1910, *Butler 1621* (MBG, P, US); Mount Shasta, 13–27 July 1892, *Palmer 2529a* (US); Soda Springs, Nevada Co., 30 July 1881, *Jones 2598* (P); Round Valley, Mendocino Co., 20 May–20 June 1898, *Chestnut* (US); near Clear Lake, 1865, *Torrey 417* (G, NY); Clear Lake, Lake Co., 12 July 1929, *Blankinship* (MBG); southern slope of Mount Sanhedrin, Lake Co., 19 July 1902, *Heller 5919* (G, MBG, NY, P, US); west of Windsor, near Russian River, Sonoma Co., 27 June 1902, *Heller 5785* (F, G, MBG, NY, P, US); Oak Knoll, 5 May 1901, *Braunton 378* (US); Irish-town, Amador Co., June 1893, *Hansen 964* (MBG); West Point Bridge, Calaveras Co., 7 July 1896, *Hansen 1823* (US); Stanford University, Santa Clara Co., April 1898, *Abrams* (P); San Jose, 14 July 1899, *Pammel 187* (MBG); Santa Cruz, 21 June 1881, *Jones* (G, P); in pine woods, Pacific Grove, 25 May 1903, *Heller 6778* (F, G, MBG, NY, P, US); Carmel Bay, Sept. 1902, *Elmer 4045* (G, P); Monterey, *Hartweg 1924* (G, NY); Monterey, Aug. 1917, *Parish 11590* (P); Santa Lucia Mountains, May 1898, *Plaskett 142* (NY, US); San Antonio River, 1880, *Vasey* (US); Wood's Creek, Fresno Co., 19 June 1910, *Clemens* (P); San Luis Obispo, 26 June 1876, *Palmer 342* (MBG, NY, US); San Luis Obispo Co., 19 June 1887, *Summers* (MBG, P); Santa Barbara Co., 1865, *Torrey 416* (G, NY); Santa Barbara, May 1902, *Elmer 3846* (MBG, P, US); seep, base of ocean bluffs, 32 km. northwest of Santa Barbara, 26 March 1925, *Munz 9295* (P); Sulphur Mountain Spring, Ventura Co., 1–2 June 1908, *Abrams & McGregor 5* (G, NY, US); Ventura, 13 April 1923, *Kendall* (P); San Buenaventura, March 1861, *Brewer 229* (US); Los Angeles, 1860–62, *Brewer 31* (G, US); Los Angeles, 29 May 1891, *Fritchey 29* (MBG); near Mesmer, 10 June 1917, *Johnston 1320* (P, US); near Pasadena, June 1893, *Haynes* (P); San Antonio Canyon, 28 June 1917, *Johnston 1608* (P); edge of woods, Palomar Mountain, 11 Aug. 1918, *Spencer 994* (G, P); wayside, Mesa Grande, 2 June 1919, *Spencer 1164* (G); Spencer Valley, near Julian, San Diego Co., 20 June 1903, *Abrams 3787* (F, G, MBG, NY, P); bottom of canyon south of "Lemon Tank," west coast, San Clemente Island, 10 April 1923, *Munz 6734* (P).

Although, from the original publication, one would naturally

infer that *V. prostrata* is Aiton's species, it is in all probability Robert Brown's. Aiton, in his acknowledgments (postscript to the fifth volume of Hortus Kewensis), mentions the new matter added by his friend Robert Brown, some without reference to his name; more tangible evidence is furnished by Schauer, who, in his monograph, indicates the specimen at Kew as *V. prostrata* R. Br.

The species is comparatively easy to distinguish by its decumbent habit, soft villous pubescence, and elongated spikes. It closely resembles *V. robusta*, which is much harsher and of limited distribution.

The following specimens differ from the species in having scarcely glandular inflorescence and fruiting calyx only 2.5–3 mm. long shortly conniving beyond the fruit:

CALIFORNIA: Three Rivers, Tulare Co., 9 July 1904, *Culbertson 4210* (MBG, P); San Bernardino, Sept. 1886, *Parish & Parish 969* (F, US); near San Bernardino, May 1894, *Parish 2819* (MBG, P); Inglewood, Los Angeles Co., 31 May 1902, *Abrams 2481* (P); San Diego Co., 1875, *Palmer 309* (G, MBG); southern California, 1876, *Parry & Lemmon 342* (NY).

23. V. robusta Greene, Pittonia **3**: 309. 1898.

Stems 6–9 dm. high, erect, paniculately branched above, glabrate or sparsely hirsute; leaves ovate or oblong-ovate with cuneate base tapering into a margined petiole, 4–7(–10) cm. long, usually 3-cleft, irregularly serrate-dentate with apiculate teeth, or incised, rugose and scabrous-pubescent above, less harshly pubescent beneath with veins prominently reticulate; spikes often crowded, subsessile, usually dense but occasionally elongated; bracts lanceolate-subulate, more or less exceeding the calyx in length, densely glandular-hirtellous; calyx 4 mm. long, densely glandular-hirsute, lobes obtusish, terminating in very unequal acuminate-subulate teeth; corolla-tube a little longer than the calyx, puberulent without; corolla-limb 3–4 mm. broad; nutlets oblong-trigonous, 2–2.5 mm. long, raised-reticulate above with striae fading out toward the base; commissural faces more or less muricate, approximately extending to the tip of the nutlet.

Distribution: California and Lower California.
Specimens examined:

California: vicinity of Ione, Dec. 1904, *Braunton 1263* (MBG, NY); Tiburon, Marin Co., 26 July 1900, *Eastwood* (G); valley back of Berkeley, 23 Oct. 1880, *Engelmann* (MBG); West Berkeley, May 1887, *Greene* (US); salt marshes, Oakland, Sept. 1886, *Congdon* (G); Temescal, Alameda Co., Aug. 1891, *Michener & Bioletti 123* (G); Crystal Springs Lake, San Mateo Co., July 1903, *Elmer 4950* (MBG, P, US); San Luis Obispo, 1876, *Palmer 341½* (F, G, NY, US); west Sherman Canyon, 18 June 1901, *Braunton 99* (US); Valdez Bay, Santa Cruz Island, 5 Sept. 1927, *Jones* (P); sandy soil near coast, Santa Catalina Island, 19 July 1915, *Macbride & Payson 850* (G); Santa Catalina Island, 20–25 July 1917, *Eastwood 6500* (US); dry stream-bed, pebbly beach canyon, Santa Catalina Island, 13 May 1928, *Dunkle 1955* (P); Avalon, Santa Catalina Island, Sept. 1896, *Trask* (MBG); Avalon, May 1897, *Trask* (F, US); Avalon, Aug. 1901, *Trask* (NY); Avalon, 28 April 1914, *Carlson* (US); Avalon, 13 June 1915, *Carlson* (G, MBG); Jamuel Valley, San Diego Co., 26 June 1875, *Palmer* (G), *310* (F, MBG, NY).

Mexico: Lower California: near Rancho Salina, foot of Guatay Grade, about 6 km. south of Rio Guadalupe, 11 Sept. 1929, *Wiggins & Gillespie 3977* (MBG); Santa Tomas, 15 July 1885, *Orcutt 1301* (MBG, US).

Verbena robusta has been much confused with the nearly related *V. prostrata*, but is quite readily distinguished from the latter by the brighter green color of the herbage, the scabrous upper surface of the leaves, and the usually dense spikes. Moreover, the mature calyx lacks the marked tendency toward subconnivent lobes, a characteristic of *V. prostrata*. The schizocarps of the two are very much alike. The collection *Orcutt 1301* has a greatly elongated inflorescence and the leaves are not particularly scabrous. The specimens *Braunton 99* and *1263* show unusually long floral bracts. These are probably atypical phases of the species or possibly hybrids.

24. V. xutha Lehm. Del. Sem. Hort. Hamb. 7, 8. 1834; Linnaea **10:** Litt.-Ber. 115. 1835–6.

V. strigosa Hook. Comp. Bot. Mag. **1:** 176. 1836, not *V. strigosa* Cham. Linnaea **7:** 256. 1832.

V. Lucaeana Walpers, Rep. **4:** 23. 1844–48.

Stems upright, 6–10 dm. tall, branched, hirsute-hispid; leaves oblong or broadly ovate in outline, 5–8(–12) cm. long, incised-pinnatifid or more often trifid with segments coarsely dentate, the lateral much smaller than the middle segment and close to the sessile base of the blade, strigose above, canescent and spreading-hirsute below, trichomes particularly prominent along the somewhat paler midrib and veins; spikes elongate, somewhat strict, not compact except at anthesis, short-pedunculate; bracts

lanceolate-subulate, subequalling or commonly a little shorter than the calyx, strigillose, ciliate; calyx 3–4 mm. long, strigose-hirsute, lobes acuminate-subulate; corolla-tube approximately as long as the calyx, the throat pubescent without; corolla-limb 5–8 mm. broad; nutlets 2 mm. long, raised-reticulate on the upper half, faintly striate below, commissural faces reaching the apex of the nutlet, muricate or muriculately scabrous.

Distribution: Alabama to Texas.

Specimens examined:

ALABAMA: Navy Cove, Aug. 1889, *Mohr* (US).

LOUISIANA: without data, *Hale* (G, MBG), *Drummond* (G); vicinity of Alexandria, 9 June 1899, *Ball 605* (MBG, US); Chopin, 6 May 1915, *E. J. Palmer 7556* (MBG); St. Martinville, 30 May 1893, *Langlois* (MBG, US); Pointe a la Hache, 25 June 1884, *Langlois 123* (US); New Orleans, 1832, *Drummond 253 bis* (K TYPE of *V. strigosa*); near Schriever, 8 June 1917, *Munz 1607* (P); Cameron, 4 July 1903, *Tracy 8708* (F, G, MBG, NY, US).

ARKANSAS: near Homan, 10 June 1898, *Eggert* (MBG); Texarkana, Aug. 1881, *Letterman* (MBG, US).

TEXAS: Gladewater, 18 June 1901, *Reverchon 2532* (MBG, NY); near Longview, 7 June 1899, *Eggert* (MBG); Corsicana, 3 Oct. 1900, *Reverchon 2118* (MBG, US); Huntsville, 1920, *Warner 43* (US); sandy land, Brazos Co., 1899, *Ness* (G); Brazos, July 1899, *Lindheimer* (MBG); dry banks of Brazos River, 23 June 1917, *Munz 1470* (P); College Station, 24 July 1899, *Reverchon* (MBG); black land prairie, Montgomery Co., 18–21 July 1900, *Dixon 473* (F, G, NY); Burton, 26 May 1872, *Hall 434* (F, G, MBG, NY, P, US); Austin, 12 July 1920, *Tharp 667, 668* (US); Austin, Aug. 1921, *Schulz 679, 701* (US); San Marcos and vicinity, 1898, *Stanfield* (NY); Industry, 1844, *Lindheimer 145* (MBG); Cypress City, May 1877, *J. Ball* (MBG); near Houston, April 1842, *Lindheimer 154* (G, MBG); swamps, Houston, Aug. 1904, *Kuntze 23811* (NY); Lotus, about 16 km. west of Houston, 8 Aug. 1921, *Ferris & Duncan 3268* (MBG); Strand, Jefferson Co., 9 April 1924, *Tharp 3166* (MBG); Galveston, 6 June 1920, *Fisher 212* (US); Columbia, 5 Oct. 1900, *Bush 1275* (MBG); Columbia, 23 Sept. 1901, *Bush 899* (MBG); Hallettsville, 9 Aug. 1912, *Fisher 122* (US); Ottine, 30 Aug. 1926, *Bogusch 1235* in part (P); Sequin, 17 June 1903, *Groth 187* (F, G, NY, US); Cave Lake, Jackson Co., 30 June 1915, *Drushel 2842* (MBG).

This species is easily distinguished by its erect habit, coarse pubescence, elongated open spike, and sessile commonly trifid leaves. It has often been confused with *V. canescens* var. *Roemeriana*, but the latter is a smaller and more compact plant.

25. V. plicata Greene, Pittonia 5: 135. 1903.

Coarse herb with stems decumbent to ascending, branched, hirtellous; lower leaf-blades elliptic-ovate, narrowed into a margined petiole of approximately the same length, 1–3(–4) cm. long, broadly obtuse, plicate, coarsely incised-dentate, often

3-lobed, more or less canescent, rugose and somewhat appressed-hirsute above, hirsute beneath and prominently marked (particularly near the margin) with whitish veins; upper leaves similar but smaller, often appearing spathulate; spikes terminal on stems and branches, ordinarily not compact; bracts ovate-lanceolate, usually exceeding the calyx, at times barely equalling it, acute, hirsute, midrib often noticeable; calyx 3.5–4 mm. long, more or less glandular-hirsute, lobes very obtuse or subtruncate, terminating abruptly in subulate teeth; corolla-tube scarcely longer than the calyx; corolla-limb 4–6 mm. broad, anterior lobe retuse; nutlets cylindric-trigonous, 2–2.5 mm. long, shallowly scrobiculate above, changing to indefinitely striate toward the base; commissural faces finely muricate-scabrous to practically smooth, not reaching the tip of the nutlet.

Distribution: Texas, New Mexico, Arizona, and northern Mexico.

Specimens examined:

TEXAS: without data, *Berlandier 2506* in part, *644* (MBG); without locality, Sept. 1881, *Havard* (US); southwestern Texas, *Reverchon 118* (G); western Texas, 1851–2, *Wright 1496* (G, MBG, NY); sandy roadside, Chillicothe, 28 Sept.–3 Oct. 1906, *Ball 1171* (US); sands, Estelline, 25 May 1904, *Reverchon 4314* (MBG); sandy waste, Garza Co., 6 June 1925, *Ruth 1289* (US); Post, 22 May 1925, *Wooton* (US); Lubbock, 24 April 1930, *Demaree 7539* (US); moist open ground along creeks, Sweetwater, Nolan Co., 27 May 1918, *E. J. Palmer 13730* (MBG); north of Colorado, Mitchell Co., June 1900, *Eggert* (G, MBG); prairie north of Stanton, Martin Co., 13 June 1900, *Eggert* (MBG); rocky and sandy soils, Comanche, 8 Aug. 1877, *Reverchon 834* in part (MBG); near Comanche, 10 May 1900, *Eggert* (G, MBG); rocky prairies, Brown Co., 10 Aug. 1877, *Reverchon 737* in part (MBG); Brown Co., April 1882, *Reverchon 737* (US); San Angelo, 19 May 1903, *Reverchon 1953* (MBG); Barstow, 14 April 1902, *Tracy & Earle 30* (F, G, MBG, NY), TYPE collection; Barstow, 15 April–3 May 1902, *Tracy & Earle 41* (NY); Oxona, 13 April 1930, *Jones 26221* (P); Davis Mountains, 5 Aug. 1918, *Young* (P); cliffs back of Fort Davis, Davis Mountains, 9–12 July 1921, *Ferris & Duncan 2726* (MBG, NY, P); about 5 km. east of Study Butte, Brewster Co., 30 June 1931, *Moore & Steyermark 3299* (MBG); Alpine, 7 June 1926, *E. J. Palmer 30523* (MBG); near Boquillas, 17 April 1919, *Hanson 619* (MBG, US); Austin, 12 May 1872, *Hall 429* (F, G, NY); gravel bars of Blanco River, Blanco, 5 April 1918, *E. J. Palmer 13282* (MBG); near Feodora, Terrell Co., 26 April 1928, *E. J. Palmer 33537* (MBG, NY); Devils River, Valverde Co., May 1913, *Orcutt 6235* (MBG); Corpus Christi Bay, Dec. 1879, *Palmer 2038* (G); Laredo, Aug. 1879, *Palmer 2040* (G); Laredo, *Berlandier 1485* (= *225*) in part (G); Laredo, 21 March 1903, *Reverchon 3904* (G, MBG, US); Laredo, 1913, *Orcutt 5555, 5717* (MBG); near Pharr, Hidalgo Co., 6 April 1931, *McKelvey 1756* (G).

NEW MEXICO: plains, Carrizoza, 8–19 May 1902, *Earle 606* (NY); in valley near Gray, 26 July 1900, *Earle 427* (NY, US); neighborhood of San Miguel, 12 Aug. 1847, *Fendler 594* (G, MBG).

ARIZONA: desert prairie, north of Tucson, 24 April 1913, *Greenman & Greenman 28*

(MBG); Tucson, 2 May 1892, *Toumey 306* (US); slopes west of Tucson, 30 Dec. 1919, *Bartram 256* (ANSP); Cienega, near Pantano, 14 June 1881, *Pringle* (F, G, MBG); valley near Camp Lowell, 8 June 1882, *Pringle* (ANSP, F, NY); near Fort Lowell, 15 Sept. 1900, *Griffiths 1595* (NY).

MEXICO:

CHIHUAHUA: Colonia Juarez, Sierra Madre Mountains, 11 Sept. 1903, *Jones* (P).

COAHUILA: Sierra Mojada Mountains, 19 April 1892, *Jones 372* (P, US).

In habit *V. plicata* is somewhat similar to *V. neomexicana*, but in inflorescence it strongly resembles *V. canescens* var. *Roemeriana*. Its distinctive character is foliar and is most easily seen in the basal and the lower stem-leaves. The leaf is obviously petioled, often 3-lobed, and very shallowly incised-dentate; moreover, the veins beneath are whitish and particularly prominent near the margin owing to the plication of the leaf and the apparent broadening of the veins in this region.

26. V. neomexicana (Gray) Small, Fl. Southeast. U. S. ed. 1, 1010. 1903, and ed. 2, 1913.

V. canescens var. *neomexicana* Gray, Syn. Fl. N. Am. **2**[1]: 337. 1878.

V. officinalis var. *hirsuta* Torr. Bot. Mex. Bound. **2**: 128. 1859.

Plant slender; stems upright, branched, hirsute; leaves 1–5 cm. long, pinnately cleft or almost parted, segments incised or coarsely toothed, rugose, somewhat scabrous and finely pustulate above, the veins more or less prominent beneath, hirsute on both surfaces; spikes solitary or tending to be panicled, usually short-peduncled, hirsute; bracts lanceolate-acuminate, commonly not longer than the calyx; calyx about 3 mm. long, hirsute-pubescent and very slightly glandular, teeth short and subulate; corolla-tube scarcely longer than the calyx; corolla-limb approximately 4 mm. broad; nutlets trigonous with convex back, 2 mm. long, very shallowly reticulate-scrobiculate on the upper half, longitudinally striate below; commissural faces extending to the tip of the nutlets.

Distribution: Texas and New Mexico.

Specimens examined:

TEXAS: Fort Davis, 13 Sept. 1918, *Young 1703* (US).

NEW MEXICO: White Mountains, Lincoln Co., 12 Aug. 1897, *Wooton 646* (NY); Ruidoso Creek, Lincoln Co., 3 July 1895, *Wooton* (NY, US); Kingston, Sierra Co., 6 July 1904, *Metcalfe 955* (US); borders of thickets, near Coppermines, 1851, *Wright 1497* (G TYPE, MBG, NY, US); Pinos Altos Mountains, 1880, *Greene* (F, MBG);

bottom of Tierra Blanca Canyon, Gila Forest, 18 Aug. 1916, *Chapline 609* (NY); G. O. S. Ranch, vicinity of Silver City, 27 Aug.–12 Sept. 1911, *Holzinger* (US); Mogollon Mountains, on or near West Fork of Gila River, Socorro Co., 28 Aug. 1903, *Metcalfe 612* (G, MBG, NY, P, US).

The collections of *Young 1703*, *Wooton 646*, and *Wooton* (collection of July 3, 1895) are by no means typical of the species, but perhaps are better placed here than elsewhere. This species appears to be very closely related to *V. canescens* and *V. gracilis*. It differs from both, however, in the upright habit and the nutlets. In both *V. canescens* and *V. gracilis* the commissural face does not extend to the tip of the nutlet and the striae on the dorsal surface are less conspicuous.

26a. Var. xylopoda Perry,[20] n. var.

Stem somewhat coarser; pubescence shorter, denser and more glandular; calyx 4 mm. long, glandular-hirsute, teeth acuminate; corolla-limb 6–10 mm. broad.

Distribution: Arizona, California, and northern Mexico.

Specimens examined:

ARIZONA: Clarkdale, 17 Sept. 1921, *W. W. Jones 344, 346* (G); Rio Verde, 8 Sept. 1865, *Coues & Palmer 571* (MBG); Skull Valley, 28 April 1903, *Jones* (MBG, P, US); near Oracle, 20 April 1930, *Harrison & Kearney 6689* (NY, P); Chiricahua Mountains, Cochise Co., 1 May 1894, *W. W. Price* (P); Paradise, Chiricahua Mountains, 16 Sept. 1907, *Blumer 2170* (F, US); Chiricahua Mine, 21 Oct. 1907, *Blumer 1804* (F, G, MBG, NY, US); Warren, Cochise Co., 20 May 1915, *Carlson* (US); Bisbee, 3 Oct. 1892, *Mearns 1013* (US); near Fort Huachuca, 1882, *Lemmon 2857* (G); Fort Huachuca, Aug. 1892, *Wilcox* (NY); Huachuca Mountains, 3 Sept. 1903, *Jones* (P); Ash Canyon, Huachuca Mountains, 6 Aug. 1909, *Goodding 334* (G, NY); Huachuca Mountains, 3 Sept. 1928, *Harrison & Kearney 5796* (US); Santa Catalina Mountains, 27 July 1917, *Munz 1149* (P); Sabino Canyon, Santa Catalina Mountains, 21 April 1922, *Hanson A1130* (MBG TYPE); about 13 km. south of Vail, 31 Aug. 1903, *Jones* (P); foothills of the Santa Rita Mountains, 11 May 1884, *Pringle* (ANSP, F, G, US); Santa Rita Forest Reserve, 8–13 Sept. 1902, *Griffiths 3431* (US); Santa Rita Range Reserve, 12 May 1912, *Wooton* (US); slopes about Calabasas, 21 April 1908, *Tidestrom 872* (US); Baboquivari Mountains, 28 March 1927, *Peebles, Harrison & Kearney 3790* (US); Baboquivari Mountains, 26 Sept. 1927, *Harrison 4778* (US); Baboquivari Mountains, 12 April 1928, *Gilman 1120* (P).

CALIFORNIA: without locality, 1876, *Palmer* (G), *339½* (US).

MEXICO:

LOWER CALIFORNIA: Big Canyon of Tantillas Mountains, 10 Sept. 1875, *Palmer* (G), *312* (F, MBG).

[20] Var. **xylopoda** Perry, var. nov., typicam simulans sed indumentum brevius densiusque; calyce 4 mm. longo glanduloso-hirsuto; calycis dentibus acuminatis; corollae limbo 6–10 mm. lato.—Collected on rocky slopes, Sabino Canyon, Santa Catalina Mountains, Arizona, 21 April 1922, *Hanson A1130* (MBG), TYPE.

SONORA: Guadalupe Canyon, 27 Aug. 1893, *Merton 2042* (US); "Niggerhead Mountains, near monument no. 82," Aug. 1893, *Mearns 1887, 1918* (US); Fronteras, June 1851, *Thurber 446* (G, NY).

CHIHUAHUA: Saint Eulalia Hills, 30 July 1885, *Wilkinson* (US); San Diego, 26 April 1891, *Hartman 608* (G); rocky hills, near Chihuahua, 16 April 1885, *Pringle 270* (ANSP, F, G, US); vicinity of Chihuahua, 8–27 April 1908, *Palmer 52* (F, G, MBG, NY, US); "between Sacramento and Chihuahua," 24 Aug. 1846, *Wislizenus 150* (MBG); in the Sierra Madre, 21 June–29 July 1899, *Nelson 6161* (G, US); near Colonia Garcia, 29 July 1899, *Townsend & Barber 192* (F, G, MBG, NY, P, US); between Colonia Garcia and Pratt's Ranch, below Pacheco, 22–24 Aug. 1899, *Nelson 6271* (G, US).

This variety differs from the species in the denser and more glandular pubescence and the larger corolla. The nutlets also are slightly longer, with the reticulations somewhat deeper than in the species, and the commissural faces hardly extend to the tip of the nutlets. The specimens *Nelson 6161, 6271* and *Townsend & Barber 192* closely resemble the above variety in inflorescence, but are more like *V. neomexicana* in the long and somewhat sparsely hirsute indument on the lower part of the stem; *Pringle 270* and *Wilkinson* approach variety *hirtella.*

26b. Var. **hirtella** Perry,[21] n. var.

Plants densely canescent-hirtellous; leaves more or less shallowly incised; bracts usually broadly ovate-acuminate; corolla-limb about 8 mm. broad.

Distribution: Texas, New Mexico, and Coahuila, Mexico.

Specimens examined:

TEXAS: rocky places between Van Horn Wells and Muerte, 2 July 1852, *Parry, Bigelow, Wright & Schott* (NY, US); Sivermore Peak, Davis Mountains, 9–12 July 1921, *Ferris & Duncan 2607* (MBG, NY); sand bars of creeks, Davis Mountains, 11 July 1926, *E. J. Palmer 30791* (MBG); Valentine, 28 April 1930, *Jones 26224* in part (P); near Shafter, Presidio Co., 26 April 1931, *McKelvey 2046* (G); Pinto Canyon, near Ruidosa, 13 April 1919, *Hanson 645* (G, NY, US); Chisos Mountains, 12 Aug. 1915, *Young 112* (MBG); foothills of Chisos Mountains, 22 May 1928, *E. J. Palmer 34065* (MBG TYPE, NY); gravelly mesa, north side of Chisos Mountains, 27 June 1931, *Moore & Steyermark 3277* (MBG).

NEW MEXICO: Socorro Mountains, 11 July 1897, *Herrick 715* (US); low mountains west of San Antonio, 14 April 1908, *Wooton 3852* (US).

MEXICO: COAHUILA: Sierra de Parras, *Purpus 1094* (F, G, MBG, NY, P).

The pubescence of this variety is much finer and shorter than

[21] Var. **hirtella** Perry, var. nov., planta dense hirtello-canescens; foliis plus minusve breviter incisis; bracteis fere late ovato-acuminatis; corollae limbo circiter 8 mm. lato.—Collected on the foothills of the Chisos Mountains, Texas, 22 May 1928, *E. J. Palmer 34065* (MBG), TYPE.

in the above. The leaves are not so deeply incised and often tend to be elongated. The leaves of *Purpus 1094* are so narrow and shallowly incised that it appears superficially like *V. perennis;* nevertheless, the character of the pubescence allies it with this variety.

27. **V. perennis** Wooton, Bull. Torr. Bot. Club **25**: 262. 1898.

Stems several from a woody base, divaricately ascending-erect, more or less strictly branched, glabrate or often finely glandular and slightly hispidulous with short stiff antrorse hairs; leaves predominantly linear, 1–4 cm. long, entire or pinnately few-lobed, erect-ascending, sparsely hispidulous, margins revolute; spikes terminal, pedunculate, slender-filiform, elongate; bracts ovate, 1.5–3 mm. long, acute, hispidulous, ciliate; calyx 4–5 mm. long, pubescence more abundant along the nerves, lobes subequal, short, acute; corolla-tube slightly longer than the calyx, pubescent; corolla-limb 5–7 mm. broad, lobes repand; fruit more or less remote; schizocarp 3 mm. long, strongly constricted along the lines of cleavage; nutlets subcylindric, reticulate-scrobiculate except at base; commissural faces smooth or slightly scabrous and not extending to the tip of the nutlet.

Distribution: Texas and New Mexico.

Specimens examined:

Texas: Glass Mountains, 25 Aug. 1925, *Tharp 3682* (US); Loyola, 5 Nov. 1902, *Seler* (G); Guadalupe Mountains, 1882, *Havard 197* (G); Guadalupe Mountains, 13 Aug. 1916, *Young* (MBG); rough grassy slopes, McKittrick Canyon, Guadalupe Mountains, 23 July 1931, *Moore & Steyermark 3611* (MBG); Guadalupe Mountains, 8 Aug. 1931, *Clarke 4250* (MBG).

New Mexico: Guadalupe, Oct. 1881, *Havard* (US); Queen, Aug. 1909, *Wooton* (MBG, US); Queen, 12–20 Aug. 1924, *Standley 40686* (US); Otero Co., 17 Aug. 1899, *Standley* (US); White Mountains, Lincoln Co., 21 July 1897, *Wooton 187* (G, MBG, NY, P), type collection; Ruidoso Creek, White Mountains, 5 Aug. 1901, *Wooton* (MBG); north of El Capitan Mountains, Lincoln Co., 31 Aug. 1900, *Earle 387* (MBG, NY, P, US); Capitan, 8–19 May 1902, *Earle 619* (NY); Gray, Lincoln Co., 6 June 1898, *Skehan 20* (F, G, MBG, NY, P, US); Berendo Creek, 13 May 1905, *Metcalfe 1568* (F, G, MBG, NY, US).

The relationship of this species is somewhat anomalous. The lobing of the leaves and the character of the nutlets seem to ally it with *V. canescens* and its relatives; whereas the pubescence and the predominance of practically entire linear-oblong leaves recall *V. simplex*. It could scarcely be confused with either,

since the character combination of an open spike, very narrow leaves, and sparsely short-strigillose hairs is not found elsewhere in the group under consideration.

28. V. gracilis Desf. Cat. Hort. Paris, ed. 3, 393. 1829.
V. remota Benth. Pl. Hartw. 21. 1839.
V. arizonica Gray, Proc. Am. Acad. **19**: 95. 1883.

Low diffusely branched herb; branches decumbent to ascending, more or less glandular, canescent, hirsute; leaves ovate, cuneate at base and narrowed into a margined petiole, 1–3 cm. long, incised-pinnatifid to pinnately cleft, segments oblong, subincised, acutish, midrib and veins impressed, sometimes glandular, hirsute particularly on the lower surface; spike terminal, slender, more or less sparsely flowered, sessile, the lowermost flowers often appearing in the axils of the upper leaves; bracts linear, attenuate, gradually reduced in length toward the tip of the spike, usually much longer than the calyx; calyx 3 mm. long, more or less glandular, hirtellous, subtruncate, teeth minute and subulate; corolla inconspicuous, the tube somewhat longer than the calyx, the limb about 2–3 mm. broad; nutlets 1.5–2 mm. long, finely scrobiculate from the apex practically to the base; commissural faces muricately scabrous.

Distribution: Arizona, Utah, and Mexico.

Specimens examined:

(Par. TYPE, MBG phot.). Described from specimen cultivated in the Botanical Garden of Paris.

ARIZONA: Gardiner's Spring, 25 June 1882, *Pringle* (ANSP, F, G, NY); Gulching Ground, Pine Canyon, Chiricahua Mountains, 5 July 1907, *Blumer 1612* (F, G, MBG, NY, US); San Pedro River, Mexican Boundary Line, 12 Oct. 1892, *Mearns 1116* (US); Tanner's Cañon, near Fort Huachuca, 1882, *Lemmon* (G); Fort Huachuca, 1890, *Patzky* (US); Fort Huachuca, *Wilcox* (NY, US), *29* (US).

UTAH: mesa east of Monticello, 25 July 1911, *Rydberg & Garrett 9201* (NY).

MEXICO:

CHIHUAHUA: waste places, Chihuahua, 26 May 1885, *Pringle 54* (G); near Chihuahua, 7 May 1887, *Pringle* (F, MBG); vicinity of Chihuahua, 1–21 May 1908, *Palmer 200* (US).

DURANGO: city of Durango and vicinity, April–Nov. 1896, *Palmer 135* (F, G, MBG, NY, US), *911* (US); city of Durango, 1 Aug. 1898, *Nelson 4593* (MBG, US); Otinapa, 25 July–5 Aug. 1906, *Palmer 456* (G, US).

AGUASCALIENTES: (Zacatecas according to the Kew specimen): *Hartweg 174* (G, K TYPE of *V. remota*, NY).

SAN LUIS POTOSI: region of San Luis Potosi, 1878, *Parry & Palmer 722* (G, MBG, US); valley of San Luis Potosi, 1876, *Schaffner 720* (ANSP, G, MBG).

QUERETARO: Queretaro, 2100 m. alt., July 1904, *Kuntze 23444* (NY).

HIDALGO: Nopala, 1 Aug. 1913, *Salazar* (US); bare hills above Pachuca, about 2500 m. alt., 23 July 1898, *Pringle 7590* (F, MBG, P); dry calcareous mesas, near Metepec Station, about 2500 m. alt., 22 June 1904, *Pringle 13159* (F, G, US).

MEXICO: vicinity of Mexico, *? Berlandier 578* (MBG, US); valley of Mexico, Pedrigal, about 2200 m. alt., 1 Sept. 1896, *Pringle 6539* (ANSP, F, G, MBG, NY, US); Santa Fe, 26 June 1865–6, *Bourgeau 361* (G); near Tlalpam, 15 July 1901, *Rose & Hay 5488* (US); near Tlalpam, July 1905, *Rose, Painter & Rose 8495* (G, US); lava beds, Tizapan, about 2250 m. alt., 24 Aug. 1900, *Pringle 9135* (G, MBG, NY).

OAXACA: near Mitla, June 1888, *Seler 22* (G).

V. gracilis is probably a relative of *V. canescens* and *V. neomexicana*. It is easily recognized by its slender habit, usually long-attenuate bracts, tiny flowers, and essentially scrobiculate nutlets. The specimen from Utah is atypical, but for practical purposes seems better referred here.

29. V. canescens HBK. Nov. Gen. et Sp. **2**: 274, *pl. 136*. 1818.

Low coarse herb; stems several and branched, decumbent to ascending, canescent, hirsute; leaves oblong-lanceolate, 1–5 cm. long, acute, remotely incised-dentate or subpinnatifid, contracted into a margined entire semiamplexicaul or petiolar base, rugose and hirtellous above, the trichomes often with minute bulbous bases, canescent-hirsute and somewhat conspicuously veined beneath, margins revolute; spikes sessile or short-peduncled, mostly solitary, loose-flowered or compact, glandular-hirsute; bracts lanceolate, acuminate, variable in length, often exceeding the calyx, hirsute, ciliate; calyx about 3 mm. long, subtruncate, with very short inconspicuous teeth; corolla-tube slightly longer than the calyx; corolla-limb 4–6 mm. broad, lobes retuse; nutlets subcylindrical, 2 mm. long, raised-reticulate above, longitudinally striate at least half way from base to apex; commissural faces muricate-scabrous, not reaching the tip of the nutlets.

Distribution: Nevada and Mexico.

Specimens examined:

NEVADA: Caliente, 9 May 1892, *Jones 554* (P).

MEXICO:

COAHUILA: Saltillo and vicinity, 15–30 April 1898, *Palmer 25* (F, G, MBG, NY, US); Saltillo, 1200 m. alt., 22 Aug. 1913, *Adole 22* [*Arsène 10626*] (F, G, MBG, NY, US); valley near Saltillo, 1848–49, *Gregg 99, 246* (MBG); canyon and elevated portion of Sierra Madre, south of Saltillo, 25 July–1 Aug. 1880, *Palmer 1047* (ANSP, G, US);

near Buenavista, 22 May 1847, *Gregg* (NY), *740* (MBG); near San Pablo, 29 April 1847, *Gregg* (NY), *545* (MBG).

ZACATECAS: near Conception del Oro, 11–14 Aug. 1904, *Palmer 303* (F, G, MBG, NY, US); Zacatecas, 1800–2100 m. alt., Aug. 1903, *Purpus 467* (US).

AGUASCALIENTES: stony places, Aguas Calientes, *Hartweg 177* (G, NY); near Aguas Calientes, 20 Aug. 1901, *Rose & Hay 6212* (NY, US); near Aguas Calientes, 9 Oct. 1903, *Rose & Painter 7741* (G, NY, US).

SAN LUIS POTOSI: Angostura, June 1911, *Purpus 5515* (F, G, NY, US); in sands around San Luis Potosi, 1876, *Schaffner 719* (ANSP, G); San Luis Potosi, 1878, *Rose, Painter & Rose 8971, 9162* (US).

PUEBLA: Cerro Guadalupe, 20 June 1909, *Nicolas* (US); margin of Atoyac, 20 June 1910, *Nicolas* (US); barren hills about Esperanza, 2660 m. alt., 17 Aug. 1905, *Pittier 414* (US).

VERA CRUZ: Orizaba, 1853, *Mueller 1215* (NY); Esperanza, 2400 m. alt., 14 Aug. 1891, *Seaton 322* (F, G, US).

OAXACA: Cerro de Wochixtlan, 16 Oct. 1921, *Conzatti 4288* (US); dry calcareous hills, Las Sedas, 1800 m. alt., 11 Aug. 1894, *Pringle 4784* (ANSP, G, MBG, NY, US); Las Sedas, about 1900 m. alt., 27 June 1895, *L. C. Smith 412* (G); Las Sedas, 1950 m. alt., 30 Aug. 1921, *Conzatti 4194* (US).

This is a low foliose species closely related to *V. neomexicana* and *V. plicata*, but distinguished from them by the semiamplexicaul elongate leaves and rather characteristic compact habit. The specimens cited from Coahuila are excellent examples of phases intermediate between the species and the variety. The collection from Nevada seems somewhat out of range. Possibly it was carried in as a weed or escaped from cultivation.

29a. Var. **Roemeriana** (Scheele) Perry, new comb.

V. Roemeriana Scheele, Linnaea **21**: 755. 1848.

Plants more densely hirsute, sparsely (if at all) glandular; floral bracts broadly ovate at base, abruptly acuminate, concave at anthesis, later slightly recurved, for the most part overtopping the calyx; dorsal surface of the nutlets reticulate-scrobiculate approximately two-thirds of their length, striate toward the base, nutlets usually more slender than in the species.

Distribution: Texas and Mexico.

Specimens examined:

TEXAS: without locality, 1846, *Lindheimer 500* (G, MBG, US); without locality, 1885, *Reverchon 737* in part (MBG); Red River, Wichita Co., 10 April 1922, *Tharp 1361* (US); sandy soils, Brown Co., *Reverchon 1961* (G, NY); near Brownwood, Brown Co., 1 Nov. 1925, *E. J. Palmer 29535* (MBG); Tom Greene Co., 1879, *Tweedy* (NY); Dove Creek, Tom Greene Co., May 1880, *Tweedy 113, 246* (US); San Angelo, 13 May 1903, *Reverchon 3903* (MBG); Legion Creek, Gillespie Co., *Jermy 182* (MBG); gravel bars of Blanco River, Blanco, 5 April 1918, *E. J. Palmer 13283* (MBG);

Austin, 16 May 1872, *Hall 430* (F, G, MBG, NY, P, US); Austin, 1 April 1918, *Young 112* (MBG); San Antonio to Austin, 18 April 1925, *Small & Wherry 11969* (NY); Dryden, 22 April 1930, *Jones 26226* (MBG, P); Langtry, Valverde Co., May 1913, *Orcutt 6111* (MBG); rocky hills at Devils River, 10 Sept. 1900, *Eggert* (MBG); Lacey's Ranch, Kerr Co., 1 June 1916, *E. J. Palmer 10002* (MBG); Kerrville, 7–14 May 1894, *Heller 1732* (G, MBG, NY, US); San Marcos, 6 Nov. 1897, *Trelease* (MBG); New Braunfels, April 1850, *Lindheimer 294* (MBG), *1074* (F, G, MBG, NY, US); Ozona, 30 April 1930, *Jones 26222* (P); Rock Springs, 17 April 1930, *Jones 26223* (P); Del Rio, 20 April 1930, *Jones 26225* (P); Fort Clark, Kinney Co., 27 Feb. 1893, *Mearns 1237* (US); Fort Clark, 10 May 1893, *Mearns 1456* (US); gravel and sand deposits along stream, Uvalde, 11 May 1918, *E. J. Palmer 13563* (MBG); dry rocky ground along small stream, Uvalde, 24 April 1928, *E. J. Palmer 33605* (MBG); near Uvalde, 30 April 1928, *E. J. Palmer 33646* (NY); 16 km. west of Uvalde, 8 June 1931, *Moore & Steyermark 3005* (MBG); near Verde Creek, near Hondo, San Antonio to Del Rio, 21 April 1925, *Small & Wherry 11980* (NY); San Antonio, April 1911, *Clemens & Clemens 974* (MBG, P), *971*, *972*, *973* (P); San Antonio, 16 March 1916, *E. J. Palmer 9183* (MBG); on limestone hill, near Bracken, 27 June 1903, *Groth 16* (F, G, NY); in fields near Rio Frio, July 1829, *Berlandier 2054*, *644* in part (G); El Jardin, 10 March 1924, *Runyon 629* (US); woods near Colorado River, near Wharton, 12 April 1925, *Small & Wherry 11826* (NY); stony hills near Goliad, 9 April 1900, *Eggert* (G, MBG); near Mathis, San Patricio Co., 5 April 1931, *McKelvey 1710* (G); west San Diego, 31 July 1931, *Clark 4041* (MBG).

MEXICO:

NUEVO LEON: Walnut Grove, 27 May 1847, *Gregg 791* (MBG, NY); Monterey, 26 May 1847, *Wislizenus 325* (MBG); Monterey, 17–26 Feb. 1880, *Palmer 1044* (ANSP, G, US); Pico Chico, near Monterey, 19 March 1900, *Canby 194* (US); Monterey, 26 July 1926, *Fisher 235* (US).

TAMAULIPAS: vicinity of Victoria, 320 m. alt., 1 Feb.–9 April 1907, *Palmer 82* (F, G, MBG, NY as no. *8*, US); from Santander to Victoria, Nov. 1830, *Berlandier 827* (G, MBG, NY); Jaumave, 1931, *von Rozynski 13*, *17*, *135* (F).

Differing from the species chiefly in its coarser less glandular pubescence and the broadly ovate abruptly acuminate bracts. A few of the above-cited specimens show transitional phases, but, as a whole, are closer to the variety.

30. V. subuligera Greene, Pittonia **1:** 156. 1888.

Stems probably several from a common base, procumbent, hirsute-pubescent; leaves ovate, gradually narrowed into a subpetiolar base, 1.5 to 4 cm. long, pinnately cleft, larger segments incised or sharply dentate, appressed-hirsute on both surfaces but especially beneath on the somewhat prominently reticulated veins; spikes short-petiolate, elongate, conspicuously bracted, in fruit interrupted; bracts lanceolate-subulate, twice as long as the calyx, ascending-spreading, reflexed in age, hirsute; fruiting calyx about 3 mm. long, pubescent, hirsute along the nerves,

lobes very short, strongly connivent over the schizocarp; corolla-tube scarcely longer than the calyx; nutlets subcylindric-trigonous, 2 mm. long, only faintly striate; commissure muriculate or smoothish, not reaching the top of the nutlet.

Distribution: Mexico.
Specimens examined:
MEXICO: DURANGO (?): "from the Sierra Madre, west of Durango," about 2400 m. alt., Sept. and Oct. 1881, *Forrer* (ANSP, F, G, NY, US), TYPE collection.

Although the general habit of this species is much like that of *V. bracteata*, the latter differs in having obtusish leaf-segments and sharply reticulate-striate nutlets with commissural faces fully as long as the nutlet.

31. V. bracteata Lag. & Rodr. in Anal. Cienc. Nat. **4**: 260. 1801.

V. bracteosa Michx. Fl. Bor.-Am. **2**: 13. 1803.

V. squarrosa Roth, Catalect. Bot. **3**: 3. 1806.

V. canescens Chapman, Fl. Southeast. U. S. 307. 1860.

V. bracteosa var. *brevibracteata* Gray, Syn. Fl. N. Am. **2**^{1}: 336. 1878.

V. rudis Greene, Pittonia **4**: 152. 1900.

V. confinis Greene, Pittonia, *l. c.*

V. bracteosa var. *albiflora* Cockerell in Daniels, Fl. Boulder, Colo. 204. 1911.

V. imbricata Wooton & Standley, Contr. U. S. Nat. Herb. **16**: 166. 1913.

Zapania bracteosa Poir. in Lam. Encyc. **8**: 843. 1808.

Stems usually several from a common base, diffusely branched, decumbent or ascending, rarely erect, coarsely hirsute; leaves 1–4(–6) cm. long, pinnately incised or usually 3-lobed (lateral lobes narrow and divaricate, middle lobe large, cuneate-obovate, incisely toothed or cleft), narrowed into a short margined petiole, hirsute on both surfaces, midrib and veins slightly prominent beneath; spikes terminal, sessile, comparatively thick, conspicuously bracted; bracts much longer than the calyx, spreading-ascending, recurved in age, coarsely hirsute, the lowermost often incised and leaf-like, the upper linear-lanceolate, acute-acuminate, entire; calyx 3–4 mm. long, hirsute particularly along the nerves,

lobes very short, connivent over the schizocarp; corolla-tube protruding slightly beyond the calyx, very finely pubescent outside the throat; corolla-limb 2.5–3 mm. broad; nutlets trigonous, approximately 2 mm. long, sharply raised-reticulate above, striate below; commissural faces reaching to the distal end of the nutlet, muricately scabrous.

Distribution: waste places, Maine to Florida, west to California, and northern Mexico.

Specimens examined:

(Herb. Bot. Gard. Madrid TYPE, MBG phot.). Described from specimen cultivated in the Botanical Garden of Madrid.

ONTARIO: Point Edward, Lake Huron, 19 July 1901, *Macoun* (NY).

MAINE: Cumberland, 12 July 1902, *Chamberlain 418* (G).

MASSACHUSETTS: Dedham, 4 Aug. 1900, *Rich* (G); Worcester, 27 June 1904, *Dewhurst* (G).

CONNECTICUT: Winsted, Winchester, 5 Sept. 1909, *Fernald* (G); Bridgeport, 4 Sept. 1908, *Eames 8137* (G).

NEW YORK: Montauk Point, 23 July 1895, *von Schrenk* (MBG).

NEW JERSEY: Weehawken, Aug. 1894, *Van Sickle* (US); Kaighn's Point, Camden, 20 July 1866, *Parker* (G, MBG).

PENNSYLVANIA: "Cementon," valley of Lehigh River, 20 Aug. 1923, *Churchill* (G); Lancaster, 29 Aug. 1900, *Heller* (US).

NORTH CAROLINA: mountains of North Carolina, June 1872, *Leroy & Ruger* (NY); Statesville, June 1872, *Ruger* (US).

GEORGIA: Cartersville, *Ravenel* (NY); Thompsons Mills and vicinity, Gwinnett Co., 14 May 1908, *Allard 207* (MBG, US); Stone Mountain, 24 May 1897, *Eggert* (MBG); Ocmulgee River, swamp below Macon Island, 8–9 July 1895, *Small* (NY); Smithville, 18 Aug. 1885, *J. D. Smith* (MBG).

FLORIDA: without data, *Buckley* (MBG), *Chapman* (MBG); Apalachicola, 5 Aug. 1889, *Biltmore Herbarium 1082b* (NY, US).

ALABAMA: roads and uncultivated fields, Sept. 1843, *Rugel* (MBG); Stevenson, 5 Sept. 1877, *Ward* (US); Valley Head, July 1898, *Ruth 495* (NY), *518* (MBG); Wilcox Co., 18 May 1840, *Buckley* (NY); sandy ground, near Atalla, Etowah Co., 9 July 1898, *Eggert* (MBG, NY); Auburn, 13 May 1898, *Earle & Baker* (P, US); Mobile, 22 May 1884, *Mohr* (US).

LOUISIANA: vicinity of Alexandria, 5 June 1899, *Ball 553* (G, MBG, NY, US).

OHIO: Sandusky, 14 Aug. 1920, *Moseley* (G).

MICHIGAN: Vincent Lake, Cheboygan Co., 15 Aug. 1917, *Ehlers 627* (G); Manistee, 8 Aug. 1882, *Morong* (G).

INDIANA: roadside east of Bass Lake, Steuben Co., 25 July 1906, *Deam 1272* (MBG, NY, US); Michigan City, 6 July 1903, *Mell & Knopf* (MBG).

KENTUCKY: without data, *Rafinesque* (G); southern Louisville, 19 Aug. 1892, *Bergmann* (MBG).

TENNESSEE: Kingston Spring, 19 Aug. 1897, *Eggert* (MBG); Sherwood, 9 June 1897, *Eggert* (MBG); Memphis, 22 June 1851, *Fendler* (G).

WISCONSIN: Fort Howard, 22 July 1887, *Schuette* (G, US); Madison, 27 Aug. 1893, *Churchill* (G); near Mirror Lake, Sauk Co., 13 July 1903, *Eggert* (MBG).

ILLINOIS: Fountaindale, 1887, *Bebb* (G); Elgin, 27 Aug. 1912, *Sherff 1797* (MBG); Havana, 18 Aug. 1904, *Gleason* (G); Monticello, 17 June 1886, *Seymour & Waite* (G); Athens, *Hall* (US); East St. Louis, 11 June 1879, *Eggert* (P).

MINNESOTA: Princeton, July 1892, *Sheldon* (G, US); Collegeville, 29 July 1912, *Chandonnet* (MBG); hills between Minnehaha and Fort Snelling, 5 July 1888, *Schuette* (G); Fort Snelling, 26 July 1899, *Mearns 524* (US); Lake City, 25 July 1883, *Manning* (G).

IOWA: Lawler, 1890, *Rolfs* (G); Fayette Co., 30 July 1894, *Fink* (US); Black Hawk Co., 15 July 1929, *Burk 542a* (MBG); Ames, 5 Aug. 1896, *Ball* (G, MBG, NY, US); Ames, Aug. 1904, *Fawcett 12* (G, MBG, NY, US); Council Bluffs, *Vasey* (G).

MISSOURI: Hannibal, *Davis 2691, 3587, 9039* (MBG); Eolia, 26 May 1914, *Davis 2414* (MBG); St. Louis, Aug.–Sept. 1838, *Riehl 9* (MBG); St. Louis, Sept. 1841, *Engelmann* (G, US); Jefferson Ave., St. Louis, 2 July 1875, *Eggert* (MBG); Kimmswick, 15 July 1885, *F. Wislizenus 284* (MBG); Williamsville, Wayne Co., 27 June 1914, *E. J. Palmer 6106* (MBG); Poplar Bluff, 12 July 1930, *Kellogg 15276* (MBG); Sibley, 30 June 1906, *Bush 4010* (G, MBG); Courtney, *Bush 2109, 8537* (MBG); bluffs of Pomme de Terre River, Polk Co., 29 July 1891, *Trelease 715* (MBG); vicinity of Gates, 26 Aug. 1912, *Standley 9362* (US); Joplin, Jasper Co., 10 July 1897, *Trelease 494* (MBG); Webb City, 1 July 1903, *E. J. Palmer 454* (MBG); Swan, 28 Sept. 1899, *Bush 601* (MBG).

ARKANSAS: Monette, 14 June 1927, *Demaree 3353* (MBG); Jonesboro, 15 June 1927, *Demaree 3371* (G, MBG); Batesville, 1 Sept. 1897, *Trelease* (MBG); Fayetteville, *Harvey 62* (MBG); Fort Smith, 1853–4, *Bigelow* (US); Fulton, 22 Sept. 1900, *Bush 1034* (MBG).

NORTH DAKOTA: Leeds, 10 Sept. 1896, *Lunell* (G, US); Fairmount, 22 July 1912, *Bergman 2370* (MBG); Mandan, 1915, *Sarvis 122* (US); Dickinson, 14 Aug. 1908, *Holgate* (G, NY).

SOUTH DAKOTA: Swan Creek, 20 July 1911, *Visher 3359* (MBG); White River Valley, 8 July 1911, *Visher 2028* (NY); Deadwood, 23 July 1913, *Carr 179* (G, MBG, US); Lead City, 7 July 1892, *Rydberg 934* (NY, US); Black Hills, near Fort Meade, 19 June 1887, *Forwood 298* (US).

NEBRASKA: "very common on sandy banks of Yellowstone River," 1853–4, *Hayden 10* (MBG); St. James, 24 June 1893, *Clements 2612* (G, US); Lincoln, 20 June 1888, *Webber* (US); near Dix, 28 Aug. 1926, *Heller 14303* (MBG).

KANSAS: prairie, Riley Co., 18 June 1895, *Norton 392* (G, MBG, NY, US); Kearney Co., 27 Aug. 1897, *Hitchcock 1129* (MBG); bottom lands of Arkansas River, south of Kendall, 15 June 1929, *Rydberg & Imler 1008* (MBG); Ulysses, 27 June 1893, *Thompson 42* (MBG, NY, US); vicinity of Richfield, 20 Sept. 1912, *Rose & Fitch 17106* (US).

OKLAHOMA: Sapulpa, 22 July 1894, *Bush 436* (MBG); near Page, 20 June 1914, *Blakeley 1462* (G); near Alva, 1913, *Stevens 680½, 2889* (G); Woods Co., 21 June 1899, *White 206* (MBG); vicinity of Fort Sill, 22 May 1916, *Clemens 11750a* (MBG); near Snyder, 23 June 1913, *Stevens 1192* (G, NY); near Camp, 11 May 1913, *Stevens 391* (MBG).

TEXAS: Dallas, *Reverchon 736, 2116* (MBG); Tarrant Co., *Ruth 109* (G, NY); Fort Worth, *Ruth 109* (US); Polytechnic, *Ruth 109* (MBG); Abilene, 22 May 1902, *Tracy 8001* (G, MBG, NY, US); west of Big Spring, Sept. 1881, *Havard* (US); Amarillo, 2 Sept. 1910, *Ball 1675* (US); banks of Red River, Randall Co., 13 Aug. 1900, *Eggert* (MBG); Canyon, 2 June 1918, *E. J. Palmer 13861* (MBG); Lubbock, 10 June 1917, *E. J. Palmer 12496a* (MBG); El Paso, 7 June 1917, *Clemens* (P); below

Doñana, *Parry, Bigelow, Wright & Schott* (US); valley of Rio Grande, 64–80 km. below El Paso, ? 1851, *Wright 567* (G), *1499* (G, MBG, NY); valley of Rio Grande, St. Elizani, May–Oct. 1849, *Wright 454* (G, US).

ALBERTA: Crow's Nest Pass, Aug. 1897, *Macoun 24268* (NY).

MONTANA: about 20 km. above Glendive, 17 July 1883, *Ward* (US); near Glendive, 19–21 Aug. 1884, *J. Ball* (G); Thompson's Falls, 27 Aug. 1892, *Sandberg, MacDougal & Heller 972* (G, P, US).

WYOMING: Yellowstone National Park, 1 Aug. 1902, *Mearns 2698* (US); Mammoth Hot Springs, 22 Oct. 1902, *Mearns 5009* (NY, US); Casper, 6 July 1901, *Goodding 207* (G, MBG, NY, P, US); Blue Grass Hills, 8 July 1894, *A. Nelson 320* (G, MBG, NY, US); Laramie Peak, 8 Aug. 1895, *A. Nelson 1652* (P); Laramie, 24 July 1900, *A. Nelson 7671* (G, MBG, NY, P, US).

COLORADO: Fort Collins, 12 July 1884, *Sheldon 38* (G); Denver, 10 Aug. 1910, *Eastwood 25* (G, MBG, US); Manitou, 12 Aug. 1901, *Clements 9* (G, MBG, NY, US); Cheyenne Canyon, Colorado Springs, 16 Aug. 1915, *Drushel 4887* (MBG); vicinity of La Junta, 26 Sept. 1913, *Rose & Fitch 17503* (MBG, US); Deer Run, 25 Aug. 1901, *Baker 920* (G, MBG, NY, P, US); Cimarron, 29 July 1901, *Baker 288* (G, MBG, NY, P); Arboles, 18 June 1899, *Baker 564* (F, G, MBG, P), TYPE collection of *V. rudis.*

NEW MEXICO: without locality, 1847, *Fendler 587* (ANSP, G, MBG, US), *592* (MBG); Raton, 21–22 June 1911, *Standley 6268* (US); Cimarron Canyon, 21–24 Aug. 1903, *Griffiths 5560* (MBG); Farmington, 8 Aug. 1904, *Wooton 2831* (US TYPE of *V. imbricata*); Las Vegas, 1927, *Arsène 18543, 18593, 18634, 18885, 18961, 18964* (all P); vicinity of Las Vegas, 1926, *Arsène 18399* (ANSP), *18407* (MBG); near Pecos, San Miguel Co., 20 Aug. 1908, *Standley 5136* (MBG, NY, US); mouth of Indian Creek, Pecos River National Forest, 25 July 1908, *Standley 4549* (G, MBG, NY, US); Upper Rio Tesuque, 24 July 1908, *Standley 4458* (MBG, US); Santa Fe, 20 July 1926, *Arsène & Benedict 15734* (MBG); vicinity of Bernalillo, 11 July 1926, *Arsène & Benedict 16790* (ANSP); Sandia Mountains, 19 Aug. 1926, *Arsène & Benedict 16600* (MBG); Sandia Mountains, July–Aug. 1914, *Ellis 221* (MBG, US); Capelin Canyon, 14 Aug. 1914, *Ellis 221* (NY); near Albuquerque, 20 June 1926, *E. J. Palmer 31117* (MBG); Roswell, 24 Aug. 1900, *Earle 351* (MBG, P, US); Queen, 2 Aug. 1909, *Wooton* (MBG, US); near Fort Craig, 1 Aug. 1880, *Rusby 336* (MBG, NY); Organ Mountains, Dona Ana Co., 30 Aug. 1897, *Wooton 409* (G, MBG, NY, US), TYPE collection of *V. confinis;* Mesilla Valley, Dona Ana Co., 6 Aug. 1907, *Wooton & Standley 3330* (F, MBG); Kingston, 18 June 1904, *Metcalfe 1008* (G, MBG, NY, P, US); Berendo Creek, Sierra Co., 20 May 1904, *Metcalfe 897* (MBG); Gila River bottom, near Cliff, Grant Co., 13 June 1903, *Metcalfe 137* (G, MBG, NY, P, US).

ARIZONA: Tuba Oasis, 15–31 July 1920, *Clute 93* (G, MBG, NY, US); vicinity of Flagstaff, 13 July 1898, *MacDougal 286* (ANSP, G, NY, US); Flagstaff, 13 Aug. 1922, *Hanson A.147* (MBG); near Prescott, 26 July 1927, *Peebles, Harrison & Kearney 4243* (US); 16 km. west of McNary, 23 June 1930, *Goodman & Hitchcock 1317* (MBG, NY).

IDAHO: valley of Clearwater River, Nez Perces Co., 30 May 1892, *Sandberg, MacDougal & Heller 264* (G, MBG, NY, P, US); Falk's Store, Canyon Co., 7 July 1910, *Macbride 200* (MBG, US); alkaline flats, sink of Big Lost River, 16 Aug. 1895, *Henderson 4070* (US); near St. Anthony, 4 July 1901, *Merrill & Wilcox 776* (G, NY, US); Boise, July 1892, *Mulford* (G, MBG); Boise, 1911, *J. A. Clark 55* (G, MBG, P, US), *279* (G, MBG, NY, P, US).

UTAH: Oquirrh Mountains, Salt Lake City, 9–16 July 1902, *Pammel & Blackwood 3589* (G, MBG); Salt Lake City, June 1869, *Watson 823* (G, NY, US); Gunnison, 25

June 1875, *Ward 256* (G, US); Greenriver, 22 June 1894, *Jones 5478* (MBG, NY, P, US); along Bullion Creek, above Marysvale, 21 July 1905, *Rydberg & Carlton 7043* (G, NY, US); Milford, 4 June 1902, *Goodding 1022* (MBG).

NEVADA: Winnemucca, 1 Sept. 1897, *Hillman* (P); saline flats, Las Vegas, 6 May 1905, *Goodding 2312* (G, MBG, NY); Colorado River bottoms, 24 km. east of Searchlight, 6 June 1915, *Parish 10288* (G, MBG).

BRITISH COLUMBIA: Kamloops, 13 June 1889, *Macoun* (NY, US).

WASHINGTON: without locality, 1889, *Vasey 468* (G, NY, US); Cascade Mountains to Fort Colville, about lat. 49°, 1860, *Lyall* (G); Oroville, 26 June 1911, *Jones* (P); Meyers Falls, 21 Aug. 1902, *Kreager 474* (G, NY, US); near Egbert Spring, Douglas Co., 1 July 1893, *Sandberg & Leiberg 340* (G, MBG, NY, US); Sentinel Bluffs, 15 July 1903, *Cotton 1363* (G, US); Pullman, 21 July 1896, *Elmer 324* (MBG, NY); Wawawai, June 1896, *Elmer* (P); near river, Prosser, 10 July 1902, *Cotton 621* (G, MBG, US).

OREGON: without locality, 1871, *Hall 393* (G, MBG, NY); margin of shallow lake, Eastern Oregon, 25 June 1898, *Cusick 1967* (G, MBG); Snake River at mouth of Cache Creek, Wallowa Co., 28 May 1897, *Sheldon 8202* (MBG, NY); about 5 km. above mouth of Clark's Creek, 9 Sept. 1897, *Sheldon 8856* (MBG, NY, US); Pilot Rock, 2 Sept. 1896, *Brown 58* (MBG, US); Pilot Rock, July 1902, *Griffiths & Hunter 18* (NY, US); Butter Creek, Umatilla Co., 14 Sept. 1894, *Leiberg 902* (G, MBG, NY, US); about 16 km. west of Boardman, 17 July 1928, *Thompson 4880* (G, MBG, US); between Mosier and Rowena, 28–30 July 1922, *Abrams 9487* (MBG, P); The Dalles, on the Columbia, 2 Aug. 1880, *Englemann* (MBG).

CALIFORNIA: near Monterey, *Bolander 426* (G); Jolon, 1880, *Vasey 512* (US); between Tulare and Tulare Lake, 25–30 Aug. 1892, *Palmer 2699* (US); near Lone Pine, Inyo Co., 14 June 1891, *Coville & Funston 953* (US); near San Bernardino, 3 June 1891, *Parish & Parish 2171* (NY, US); Soldiers Home, 20 June 1902, *Abrams 2574* (G, MBG, NY, P); near ponds, Laguna, *Munz 2207, 6349, 6598* (P); Laguna Canyon, 26 July 1916, *Crawford* (MBG, P); Blue Lake, Imperial Valley, 1 April 1903, *Abrams* (MBG, NY).

MEXICO:

LOWER CALIFORNIA: Tia Juana, *Orcutt* (F, US), *1228* (MBG); Ensenada, 31 Aug. 1886, *Orcutt 1549* (MBG); Mancadero, 31 Aug. 1889, *Orcutt 1546* (MBG).

SONORA: Alamo, 20 May 1925, *Kennedy 7032* (US).

CHIHUAHUA: 80 km. south of Juarez, 1911, *Stearns 7* (F, US); Bolsom de Mapini, 13 April 1847, *Gregg 433* (MBG).

COAHUILA: near San Juan, valley of Nazas, 11 May 1847, *Gregg 636* (MBG); valley of Nazas, near San Lorenzo, 11 May 1847, *Gregg 623* (MBG); El Toro, near Movano, July 1910, *Purpus 4524* in part (US); San Lorenzo de Laguna and vicinity, southwest of Parras, 1–10 May 1880, *Palmer 1048* (ANSP, G, US).

A readily recognized and widely distributed species varying greatly in habit and pubescence as well as in length and position of floral bracts. The typical form is a sprawling hirsute plant with laxly ascending branches and spreading bracts. In New Mexico it appears as a nearly erect herb (*V. imbricata* Woot. & Standl.) with shorter and ascending or appressed bracts (var. *brevibracteata* Gray). Some phases of this variation occur

throughout the northwest range of the species, but since these tendencies to vary are apparently lacking in correlation, they do not seem to be worthy of nomenclatorial attention.

32. V. carnea Medic. Bot. Beobacht. **1783:** 131. 1784.
V. caroliniana Michx. Fl. Bor.-Am. **2:** 14. 1803.
V. carolinensis Small, Fl. Southeast. U. S. ed. 1, 1009. 1903, and ed. 2, 1913.
Phryma caroliniensis Walt. Fl. Car. 166. 1788.
Styleurodon carolinianum Raf. Fl. Tellur. **2:** 104. 1836.

Cinereous perennial; stems simple or sparingly branched above, ascending, puberulent; leaves spathulate to oblong or the upper oblong-hastate, sessile, shallowly serrate-dentate, scabrous above, less harsh and spreading-pubescent along the prominently reticulated veins of the lower surface; spikes terminal, pedunculate, chiefly solitary but occasionally in 3's, slender with crowded tips, more open in fruit; bracts lanceolate, about one-half shorter than the calyx, glandular-pubescent; calyx about 5 mm. long, glandular-pubescent, lobes acute, unequal; corolla-tube slightly longer than the calyx, pubescent without; corolla-limb about 5 mm. broad, segments somewhat truncate; anthers glandless; schizocarp 3 mm. long, not readily separating into 4 nutlets, longitudinally sulcate and commonly scrobiculate on the upper part.

Distribution: North Carolina to Florida, and west to Texas.

Specimens examined:

North Carolina: Pinehurst, 3 Sept. 1897, *Katzenstein* (G); open pine woods 3 km. south of James City, 11 July 1922, *Randolph* (G); Burgaw, Aug. 1878, *Hyams* (US), June 1879, *Hyams* (MBG).

South Carolina: Santee Canal, *Ravenel* (G); sandy open pine woods near Navy Yard, Charleston, 27 April 1912, *Robinson 26* (G); Summerville, June 1891, *Taylor* (US); Bluffton, 1881, *Mellichamp* (US); sand bank near Orangeburg, 8 May 1907, *House 3276* (NY); Aiken, July 1870, *Ravenel* (NY, US); sandy ground north of Graniteville, 23 May 1899, *Eggert* (MBG).

Georgia: sandy hills north of Augusta, 22 May 1899, *Eggert* (MBG); Augusta, 14 May 1900, *Cuthbert 268* (NY); Alexander, *Ellis* (P); Flint River at Albany, 24–28 May 1895, *Small* (F, NY).

Florida: without locality, *Buckley* (G, MBG); without locality, *Chapman* (NY); Lake City, 27 Feb. 1893, *Rolfs 191* (MBG); pine barren, Duval Co., 29 April 1902, *Fredholm 5136* (G, MBG, US); Oakwood, Duval Co., 1 June 1893, *Fredholm 110* (P); dry pine barrens, near Jacksonville, May, *Curtiss 1959* (G, MBG, NY, US), 8 May 1884, *Curtiss 4765* (G, NY, US), 29 April 1893, *Curtiss 4386* (MBG, US);

Hibernia, March 1869, *Canby* (G, NY, US); St. Augustine, 1877, *Reynolds* (NY); Gainesville, 11 May 1925, *O'Neill 986* (US); dry sandy woods, Irvine, 29 April 1930, *Moldenke 1091* (MBG, NY); Ocala, Marion Co., 2 April 1879, *J. D. Smith* (US); high pine land, vicinity of Eustis, 1–15 May 1894, *Nash 601* (G, MBG, US); pine lands at Lake Helen, 28 April 1906, *Deam 1799* (US); Fort Meade, March 1880, *J. D. Smith* (US); between Tallahassee and St. Marks, April 1843, *Rugel* (NY); sandy open ground near Tallahassee, 9 April 1929, *E. J. Palmer 35235* (G, MBG); Aspalaga, *Chapman* (MBG); dry pine barrens, near Apalachicola, 11 Aug. 1889, *Biltmore Herbarium 4761a* (G, NY, US).

Alabama: without locality, 1859, *Beaumont* (G); Auburn, Lee Co., 10 May 1896, *Earle & Underwood* (NY); Auburn, 10 Feb. 1897, *Earle & Baker* (NY); Pinewoods, *Buckley* (NY); woods, Spring Hill, 6 Aug. 1897, *Bush 312* (MBG, NY, US); Spring Hill, 25 June 1915, *Drushel* (MBG); open barrens, Spring Hill, June–July 1919, *Graves 621* (MBG, US); Mobile, May 1875, *Curtiss* (MBG); Mobile, June 1879, *Mohr* (US).

Mississippi: sandy soil, southern Mississippi, 1859, *Hilgard* (MBG); Ocean Springs, May 1892, *Seymour & Earle 118* (G, MBG); Ocean Springs, 8 May 1895, *Skehan* (MBG); Biloxi, 21 April 1898, *Tracy 4981* (G, MBG, NY, US); Long Beach, 6 Aug. 1891, *Joor* (MBG); Harrison Co., 19 April 1927, *Woodson & Anderson 1577* (MBG).

Louisiana: vicinity of Covington, 30 April 1920, *Arsène 12117* (US), 8 May 1920, *Arsène 11820* (US).

Texas: sandy open ground, Fletcher, Hardin Co., 25 April 1916, *E. J. Palmer 9559* (MBG).

One of the most distinct species of the genus in North America. It is readily recognized by the long slender graceful spike, the sessile elongate leaves, and the tardy splitting of the schizocarp. The last character is probably Walter's reason for placing this species in the genus *Phryma*.

Section 2. Glandularia Schauer

2. Glandularia Schauer in DC. Prodr. **11**: 550. 1847.

Sterile style-lobe adjacent to stigmatic surface and protruding well beyond it; ovary in later stages definitely but shallowly lobed at the distal end, with the style apparently inserted in a depression between the lobes; schizocarp constricted along the lines of cleavage; connective of the upper anthers chiefly appendaged. Herbaceous perennials with prostrate, decumbent, ascending, and sometimes erect stems. Flowers usually showy, at first fascicled or somewhat corymbose, later spicate. Calyx usually more than twice as long as the schizocarp and constricted or contorted beyond it. Species 33–51.

Key to the Species

A. Leaves tapering into a margined petiole or subsessile or sessile, at least not subauriculate and semiamplexicaul at the base.
B. Nutlets with a very definite beak parallel to the axis of the schizocarp.. ..... *33. V. quadrangulata*
B. Nutlets with an indefinite beak or none.
C. Nutlets suggesting a tendency toward a beak (a slight protrusion horizontal to the axis of the schizocarp); commissural face practically reaching the tip of the nutlet..... *34. V. delticola*
C. Nutlets without a beak; commissural face not reaching the tip of the nutlet.
D. Nutlets subovoid, lateral surfaces ventricose and smooth, not at all similar to the dorsal surface..... *39. V. tumidula*
D. Nutlets subcylindrical, lateral surfaces not ventricose and usually scrobiculate, similar to the dorsal surface.
E. Leaves shallowly lobed, incised or toothed.
F. Corolla-tube slightly longer than the calyx.
G. Calyx villous-hirsute, somewhat glandular..... ..... *47a. V. Gooddingii* var. *nepetifolia*
G. Calyx short-strigillose, not glandular..... *38. V. tampensis*
F. Corolla-tube at least one-half longer than the calyx.
H. Plants prostrate-decumbent; leaves varying from cuneate to orbicular-ovate; calyx-teeth short (1–1.5 mm. long)..... ..... *37. V. maritima*
H. Plants ascending, decumbent only at base; leaves ovate to elongate-ovate; calyx-teeth long (2–3 mm.).... *35. V. canadensis*
E. Leaves 3-cleft, incised-pinnatifid or bipinnatifid.
I. Corolla-tube protruding well beyond the calyx.
J. Corolla-tube approximately twice as long as the calyx.
K. Plants somewhat hirsute; both surfaces of the leaves similar in color; spikes elongating in age; calyx-teeth 2–3 mm. long..... *35. V. canadensis*
K. Plants hispid-hirsute; lower surface of leaves lighter than the upper; spikes compact at maturity; calyx-teeth rarely surpassing 2 mm. in length.
L. Plants prostrate-decumbent; spikes few-flowered.. *36. V. elegans*
L. Plants ascending, decumbent only at base; spikes many-flowered..... *36a. V. elegans* var. *asperata*
J. Corolla-tube one-third to one-half longer than the calyx.
M. Floral bracts equalling or exceeding the calyx; calyx not glandular, hispid-hirsute.
N. Leaves bipinnatifid, ultimate segments linear-oblong.. ..... *40. V. bipinnatifida*
N. Leaves 3-cleft, with segments remotely incised or lobed, ultimate segments much broader than in the above. ..... *40a. V. bipinnatifida* var. *latilobata*
M. Floral bracts shorter than the calyx; calyx for the most part somewhat glandular, hispid-hirsute to villous-pubescent.

O. Leaves sessile, strigose-hispid.....*45. V. Andrieuxii*
O. Leaves subsessile to short-petiolate, hispidulous-hirsute to hirtellous.
P. Plants coarse; leaves usually 2.5–4 cm. long, hispidulous-hirsute; corolla-limb 6–12 mm. broad; nutlets 2.5–3 mm. long.
Q. Calyx-teeth long (2–3 mm.).
R. Plants usually tall (2–4 dm.); leaves bipinnatifid with ultimate segments lanceolate; calyx-teeth not especially conspicuous in mature fruit.
S. Calyx glandular.....*41. V. ambrosifolia*
S. Calyx not glandular.*41a. V. ambrosifolia* f. *eglandulosa*
R. Plants usually low (1–2 dm.); leaves trifid with segments more or less incised; calyx-teeth conspicuously long in mature fruit.....
.....*43a. V. ciliata* var. *longidentata*
Q. Calyx-teeth short (usually less than 2 mm.).
T. Plants decumbent-ascending or prostrate, densely hirsute; calyx somewhat glandular, hispidulous-hirsute, scarcely viscid.
U. Plants with decumbent-ascending loose habit; leaf-margin slightly revolute.....*43. V. ciliata*
U. Plants with prostrate compact habit; leaf-margin strongly revolute..*43b. V. ciliata* var. *pubera*
T. Plants ascending-erect, more or less hirsute; calyx densely glandular-hirsute and somewhat viscid-pubescent.....*42. V. Wrightii*
P. Plants slender; leaves smaller, 1–2.5 cm. long, hirtellous; corolla-limb 5–6 mm. broad; nutlets 2 mm. long.....*44. V. racemosa*
I. Corolla-tube slightly longer than the calyx.
V. Calyx-teeth acute-subulate, short (less than half as long as the calyx-tube).
W. Plants repent, slender; spikes few-flowered, scarcely protruding beyond the subtending leaves.
X. Corolla-limb 5–7 mm. broad.....*46. V. teucriifolia*
X. Corolla-limb 3 mm. broad..*46a V. teucriifolia* var. *corollulata*
W. Plants decumbent-ascending, stouter; spikes many-flowered, subsessile or short-pedunculate.
Y. Plants more or less hirsute, decumbent; corolla inconspicuous, limb 3–5 mm. broad.....*48. V. pumila*
Y. Plants densely pilose-villous, ascending; corolla conspicuous, limb 8–9 mm. broad.....*47. V. Gooddingii*
V. Calyx-teeth subulate-setaceous, elongate (approximately half as long as the calyx-tube).
Z. Plants decumbent-ascending, villous-pubescent; leaves ovate, trifid with the segments coarsely dentate.*49. V. setacea*
Z. Plants erect, sparsely hirsute; leaves narrow and elongate, bipinnatifid, with the segments linear.....*50. V. lilacina*
A. Leaves subauriculate and semiamplexicaul at the base.....*51. V. amoena*

33. V. quadrangulata Heller, Contr. Herb. Franklin & Marshall College (Bot. Expl. S. Texas) **1:** 84, *pl. 6.* 1895.

V. pumila f. *albiflora* Standl. Field Mus. Publ. Bot. **4:** 256. 1929.

Helleranthus quadrangulatus Small, Fl. Southeast. U. S. ed. 1, 1011. 1903, and ed. 2, 1913.

Low plant more or less diffusely branched from the base; stems prostrate-ascending, rooting at the lower nodes, hirsute; leaves 1–3 cm. long, broadly ovate, with cuneate base contracted into a very short margined petiole, incised-pinnatifid or 3-cleft, with lobes incised, strigose-hirsute on both surfaces; spikes compact, sessile or nearly so, terminal; bracts somewhat shorter than the calyx, narrowly lanceolate, hirsute, ciliate; fruiting calyx 5(–6) mm. long, hirsute, particularly along the ribs, lobes short, subulate-tipped; corolla-tube slightly longer than the calyx, practically glabrous without; corolla-limb 2.5–3 mm. broad, lobes emarginate; anthers unappendaged; ovary surmounted by subhemispheric-angulate stylopodium; schizocarp constricted along the lines of cleavage; nutlets 4 mm. long, crowned with a smooth obtusish beak, shallowly reticulate-scrobiculate above, longitudinally striate and somewhat abruptly enlarged at base.

Distribution: Texas and northern Mexico.

Specimens examined:

TEXAS: sandy beach and open flats, Rio Bravo del Norte, *Schott* (NY); Devils River, Val Verde Co., 15 May 1913, *Orcutt* (MBG); creek between Del Rio and Comstock, 22 April 1925, *Small & Wherry 12010* (NY); "Brackett" (? Brackettville), 22 Aug. 1900, *Trelease 101* (MBG); Spofford Junction, 22 March 1900, *Canby 193* (US); Uvalde, 28 April 1928, *E. J. Palmer 33592* (G, MBG, NY); San Antonio, April 1922, *Schulz 767* (US); 24 km. south of San Antonio, 28 April 1921, *Schulz 475* (US); woods near Colorado River, near Wharton, 12 April 1925, *Small & Wherry 11824* (NY); railroad north of Moore Station, Frio Co., 5 April 1901, *Eggert* (MBG); sandy open ground, Pleasanton, 16 May 1916, *E. J. Palmer 1747* (MBG); El Jardin, 10 March 1924, *Runyon 628* (US); Eagle Pass, April 1883, *Havard* (US); Kennedy-Beeville, 15 March 1929, *Tharp 5538* (US); Kennedy-Portland, 17 March 1929, *Tharp 5610* (US); Corpus Christi Bay, Dec. 1879, *Palmer 1046* (G); Corpus Christi, 10 March 1894, *Heller 1388* (G, MBG, NY), TYPE collection; San Diego, 1885–6, *Croft 78* (NY); Kingsville, 27 March 1920, *High 75* (MBG); between Laredo and Bejar, Feb. 1828, *Berlandier 1485=225* (G); Laredo, Feb. 1891, *Dodge 154* (US); sandy ground, Laredo, 6 April 1901, *Eggert* (G, MBG); Laredo, 21 March 1903, *Reverchon 3902* (G, MBG, NY, P, US); Laredo, 1913, *Orcutt 5542, 5730* (MBG); San Antonio, 1926, *Pagel 2208* (F); Guadalupe, 168 km. southwest of San Antonio,

Sept. 1879, *Palmer 2039* (G); chaparral near Harlingen, 6 April 1925, *Small & Wherry 11903* (NY); Brazos Santiago, 1889, *Nealley* (F, US).

MEXICO: TAMAULIPAS: east of Matamoros, May 1836, *Berlandier 3018=1518* (MBG).

Verbena quadrangulata is an anomalous species often confused with *V. pumila* on account of the strong similarity in habit, but is perhaps more closely related to *V. delticola*, the only other known North American species with a tendency toward developing a nutlet with a beak. The style is enlarged at the base into a persistent subhemispherical body; hence, when the nutlets split apart they appear as if elongated at the apex into a beak-like appendage. Although the anthers are not glandular and the flowers not showy, the species seems to belong to the section *Glandularia*.

34. V. delticola Small,[22] n. sp.

Stems decumbent to ascending, branched, more or less hirsute; leaves ovate-deltoid, 3–7 cm. long, with truncate-cuneate base narrowed into a margined petiole, obtusish or acutish, coarsely serrate-dentate, often trilobed, usually thin, sparsely appressed-hirsute on both surfaces, trichomes above often with minute bulbous bases; spikes peduncled, fascicle-like in anthesis, becoming elongated in fruit; bracts linear-attenuate, shorter than or equalling the calyx; calyx 7–8 mm. long, sparsely glandular, hirsute, lobes slender, subulate, unequal; corolla-tube protruding well beyond the calyx, pubescent or glabrate without; corolla-limb probably 10 mm. broad, segments emarginate; nutlets 3 mm. long, subcylindrical, reticulate from the apex to the definitely broadened base; commissural face practically reaching the tip of the nutlet, muricately scabrous.

[22] **V. delticola** Small, spec. nov., herbacea verisimiliter perennis; caulibus decumbentibus vel ascendentibus ramosis plus minusve hirsutis; foliis ovato-deltoideis basi cuneata in petiolum alatum attenuatis 3–7 cm. longis obtusiusculis vel acutis grosse serrato-dentatis saepe trilobis utrinque sparse adpresso-hirsutis; spicis pedunculatis; bracteis lineari-attenuatis calyce brevioribus vel subaequantibus; calyce 7–8 mm. longo sparse glanduloso hirsuto; calycis dentibus subulatis inaequalibus; corollae tubo exserto extus pubescente vel glabrato; corollae limbo circiter 10 mm. lato segmentis emarginatis; coccis subcylindricis 3 mm. longis superne reticulatis.—Collected at Las Palmas Ranch, vicinity of Brownsville, Texas, 1–5 Aug. 1921 *Ferris & Duncan 3161* (NY), TYPE.

Distribution: Texas and Mexico.

Specimens examined:

TEXAS: Edinburg, *Hooker 5999* (US); Samfordyce, 1927, *Molby 7224* (US); chaparral near Harlingen, 16 April 1925, *Small & Wherry 11901* (NY); Brazos Santiago, 1889, *Nealley 117, 118* (US); Reynoldsville, Cameron Co., 11 April 1905, *Lewton 141* (US); Las Palmas Ranch, vicinity of Brownsville, 1–5 Aug. 1921, *Ferris & Duncan 3161* (MBG, NY TYPE).

MEXICO:

NUEVO LEON: Rinçonada, 24 April 1847, *Gregg 752* (MBG); Guajuco, March 1880, *Palmer 1051* (G, US); Walnut Grove, near Monterey, 7 Feb. 1847, *Gregg 202* (MBG); river gravel, near Monterey, 11 July 1888, *Pringle 2228* (G); Sierra Madre, near Monterey, 25 Aug. 1903, *Pringle 11843* (G, US); Loma del Obispodo, Monterey, 1 Feb. 1907, *Safford 1221* (US); Monterey, Guadalupe, May 1911, *Arsène 6129* (G, MBG, NY, US); Monterey, 10–11 March 1923, *Tharp 1826* (US).

TAMAULIPAS: Victoria, 23 May 1898, *Nelson 4424* (G, US); vicinity of Victoria, 1 Feb.–9 April 1907, *Palmer 39* (F, G, MBG, NY, US); San Fernando to Jimeney, 26–27 Feb. 1902, *Nelson 6628* (? *6028*) (G, MBG, NY, US); vicinity of Tampico, 1–31 Jan. 1910, *Palmer 90* (F, G, MBG, NY, US).

SAN LUIS POTOSI: La Hoya, *Liebmann 11314* (US).

PUEBLA: near Metlaltoyuca, 31 Jan. 1918, *Goldman 42* (US).

VERA CRUZ: Wartenburg, near Tantoyuca, April 1858, *Ervendberg 236* (G); Colipa, March 1841, *Liebmann 11313* (US).

Superficially, this species bears a strong resemblance to *V. canadensis*, but usually the leaves are not so deeply incised. Its distinctive character is found in the nutlet. Commonly, in the section *Glandularia*, the schizocarp is shallowly lobed at the apex; hence, the style appears to be attached in a very definite depression and ordinarily the commissural face does not reach the tip of the nutlet. In *V. delticola*, however, the depression is indefinite, the commissural face practically reaches the tip, and the separate nutlets viewed from the lateral or ventral surface suggest a tendency toward developing a beak. In *Safford 1221* a small beak is present.

35. V. canadensis (L.) Britton, Mem. Torr. Bot. Club **5**: 276. 1894.

V. Aubletia Jacq. Hort. Vind. **2**: 82, *pl. 176*. 1772; Linn. f. Suppl. 86. 1781; Bot. Mag. *pl. 308*. 1795; Bot. Reg. *pl. 294*. 1818.

V. Oblaetia Retz. Svenska Vet. Akad. Nya Stockh. Handl. **34**: 143, *pl. 5*. 1773.

V. Obletia Medic. Act. Acad. Theod.-Palat. **3**: 194, *pl. 7*. 1775.

V. longiflora Lam. Tab. Encyc. **1**: 57. 1791.

V. rubra Salisb., Prodr. 71. 1796.
V. Lamberti Sims in Bot. Mag. *pl. 2200.* 1821.
V. Aubletia var. *Drummondi* Lindl. Bot. Reg. *pl. 1925.* 1837.
V. Lamberti var. *rosea* Sweet, Brit. Fl. Gard. II. **4**: 363. 1838.
V. Drummondii Hort. ex G. Don in Loud. Hort. Brit. Suppl. **2**: 680. 1839.
V. Drummondii (Lindl.) Baxt. ex Small, Fl. Southeast. U. S. ed. 1, 1011. 1903, and ed. 2, 1913.
V. canadensis var. *Lamberti* Thell. Fl. Advent. de Montpellier, 428. 1912.
Buchnera canadensis L. Mant. 88. 1767.
Billardiera explanata Moench, Method. 369. 1794.
Anonymos caroliniensis Walt. Fl. Carol. 164. 1788.
Glandularia caroliniensis J. F. Gmel. Syst. Veg. 2^2: 920. 1791.
G. Aubletia Nutt. Trans. Am. Phil. Soc. **5**: 184. 1837.

Stems decumbent to ascending, rooting at the lower nodes, more or less branched, spreading-hirsute or glabrate; leaves ovate to elongate-ovate, 3–9 cm. long, 1.5–4 cm. broad, with truncate or cuneate base narrowed into a margined petiole, incised or incised-pinnatifid or 3-cleft, appressed-hirsute or glabrate on both surfaces; spikes pedunculate, fascicle-like in anthesis, becoming elongated in fruit; bracts shorter than (or occasionally as long as) the calyx, linear-attenuate, hirsute, usually ciliate; calyx glandular-hirsute, in fruit 10–13 mm. long, lobes very slender, subulate-setaceous, unequal, the posterior lobe much shorter; corolla-tube about twice as long as the calyx, glabrous without or finely pubescent or glandular; corolla-limb 11–15 mm. broad, segments emarginate; anther-glands not minute; schizocarp at maturity constricted along the lines of cleavage; nutlets 3(–3.5) mm. long, subcylindrical with slightly broadened base, reticulate-scrobiculate; commissural face muricate-scabrous.

Distribution: North Carolina to Florida, and west to Colorado and Texas.
Specimens examined:
NORTH CAROLINA: roadsides, Kittrell, 11 April 1889, *Sturtevant* (MBG).
SOUTH CAROLINA: Abbeville District, *Hexamer & Maier* (G).
GEORGIA: by roads and margins of fields through lower Georgia and middle Florida, March 1843, *Rugel* (MBG).
FLORIDA: Fort King, *Alden* (NY); St. Nicholas, Duval Co., July 1898, *Lighthipe 599* (NY); Mous Creek, St. John's Co., 15 April 1879, *J. D. Smith* (US); rich woods in Daytona, 30 March 1906, *Deam 1831* (US); Ocala, 4 April 1879, *J. D. Smith* (US).

ALABAMA: above Tuscaloosa, 8 May 1875, *E. A. Smith* (US); above Tuscaloosa, 11 April 1892, *Ward* (US).

LOUISIANA: without locality, *Hale* (G, US), *Short* (NY); Minden, 15 April 1901, *Trelease* (MBG); Winnfield, 13 April 1912, *Petersen* (NY); Natchitoches, 16 March 1915, *E. J. Palmer 7001* (MBG); Chopin, Natchitoches Parish, 23 March 1915, *E. J. Palmer 7071* (MBG); vicinity of Covington, 20 March 1920, *Arsène 11982* (US); Jacksonville, *Drummond* (G); Cameron, 4 July 1903, *Tracy 8707* (G, MBG, NY, US).

KENTUCKY: Shelbyville, *Flint* (G).

TENNESSEE: Cedar Glades, north of Lavergne, 4 May 1898, *Eggert* (MBG).

IOWA: Council Bluffs, *Vasey* (G).

MISSOURI: St. Louis, May 1833, *Engelmann 334* (MBG); St. Louis, 8 July 1910, *Sherff 333* (G); Windsor Springs, 30 May 1890, *Hitchcock* (MBG); St. Louis Co., 16 May 1879, *Eggert* (MBG, US); Allenton, 27 April 1887, *Eggert* (MBG); west of Kimmswick, 13 April 1918, *Drushel 3659* (MBG); Kimmswick, 30 April 1905, *Johnson* (MBG); Hillsboro, 24 May 1885, *F. Wislizenus 285* (MBG); Crystal City, 19 Aug. 1886, *Eggert* (MBG); sandy ground north of Crystal City, 6 May 1891, *Eggert* (MBG); Silica, 18 April 1896, *Eggert* (MBG); Shot Hill, near Selma, 30 May 1923, *Greenman 4231* (MBG); Victoria, 10 May 1890, *Hitchcock* (MBG); Old Mines, Washington Co., 19 Aug. 1928, *Kellogg 1958* (MBG); Blackwell, St. Francois Co., 18 April 1897, *Trelease 714* (MBG); Central, 28 Aug. 1898, *Trelease 1161* (MBG); banks of Pilot Knob Creek, 9 Sept. 1859, *Engelmann* (MBG); Pilot Knob, July 1867, *Engelmann* (MBG); Granite Mountain, Iron Co., 24 May 1918, *Greenman 4076* (MBG); Ironton, 4 May 1923, *Epling 6134* (MBG); Shepard Mountain, Iron Co., 26 May 1918, *Greenman 3870* (MBG); Shut In, Stout Creek, Iron Co., 28 May 1916, *Drushel 2762* (MBG); near Silvermine, Madison Co., 20 May 1927, *Greenman* (MBG); Mine La Motte, 19 May 1927, *Greenman* (MBG); Grandin, 5 May 1901, *Bush 318* (MBG); dry rocky banks, Shannon Co., 13 April 1889, *Bush 1168* (MBG); Jerome, 5 April 1914, *Kellogg* (MBG); Jackson Co., 28 March 1864, *Broadhead* (MBG); Jackson Co., 28 May 1893, *Bush 283* (G, MBG); Independence, 1 June 1895, *Tindall* (MBG); Dodson, 27 April 1904, *Bush 1933* (MBG); rocky woods, Vale, 13 April 1908, *Bush 4922* (MBG, US); barrens, Greenwood, 28 Oct. 1915, *Bush 2901* (G, MBG, NY); Greenwood, 25 April 1911, *Bush 6439* (MBG); Jasper Co., 16 Aug. 1893, *Bush* (MBG); Oronogo, 10 July 1910, *E. J. Palmer 2996* (MBG); open banks, Webb City, 19 April 1903, *E. J. Palmer 559* (MBG); Webb City, 4 May 1902, *E. J. Palmer 304* (MBG); prairie, vicinity of Pearl, 22 Aug. 1912, *Standley 9171* (US); Willard, 20 July 1919, *Blankinship* (P); Springfield, 31 July 1892, *Dewart 74* (MBG); vicinity of Springfield, 29 Aug. 1911, *Standley 8367* (US); barrens, Swan, 25 Sept. 1899, *Bush 569* (MBG); Swan, 7–9 Oct. 1915, *Eggleston 12240* (NY, US); Galena, Stone Co., 27 May 1914, *E. J. Palmer 5682* (MBG); limestone slopes, "Bald Joe," Stone Co., 30 April 1924, *E. J. Palmer 24616* (MBG); near Seligman, Barry Co., 4 April 1926, *E. J. Palmer 29804* (MBG).

ARKANSAS: Eureka Springs, 19 April 1899, *Trelease* (MBG); top of dolomite hill along White River, near Beaver, Carroll Co., 23 Oct. 1925, *E. J. Palmer 29333* (G, MBG, NY); bluffs, Van Buren, 5 April 1929, *Demaree 6411* (US); 14 km. west of Fort Smith, 1853–4, *Bigelow* (US); Fort Smith, 1 April 1928, *Benke 4566* (G); Hot Springs, 31 Oct. 1899, *Trelease* (MBG); Malvern, *Letterman* (MBG, US); Prescott, 8 April 1900, *Bush 545* (MBG); clay barrens, Fulton, Hempstead Co., 28 April 1914, *E. J. Palmer 5407* (MBG); Red River, *Pitcher* (G).

KANSAS: Princeton, 19 May 1919, *Street* (P); between Olathe and Pleasanton, Miami Co., 18 June 1929, *Rydberg & Imler 22* (MBG, NY); open woods, Cherokee

Co., 1896, *Hitchcock 790* (G, MBG, NY, US); vicinity of Edna, 28 June 1929, *Rydberg & Imler 379* (NY).

OKLAHOMA: near Miami, Ottawa Co., 26 Aug. 1913, *Stevens 2340* (G, MBG, NY, US); Sapulpa, 22 July 1894, *Bush 437* (G, MBG, NY, US); Perkins, 14 June 1893, *Waugh 168* (MBG); upland woods, Muskogee, 30 June 1918, *E. J. Palmer 14283* (MBG); Norman, 17 April 1915, *Emig 415* (MBG, US); near Page, 20 May 1914, *Blakeley 1471* (G); near Paul's Valley, Garvin Co., 19 April 1913, *Stevens 109* (G, MBG); Colbert Station, 19 June 1891, *Sheldon 26* (US); near Idabel, 18 May 1916, *Houghton 3643* (G, MBG).

TEXAS: Denison, 22 April 1904, *Reverchon* (MBG); Denison, 15 March 1904, *Reverchon* (MBG); wet places, T. & C. Junction, Bowie Co., 5 Sept. 1900, *Eggert* (G, MBG); sandy ground north of Longview, Gregg Co., 19 April 1899, *Eggert* (MBG); open ground, Longview, 21 April 1915, *E. J. Palmer 7124* (MBG); sands, Dallas, *Reverchon* (G), *740* (MBG); Newland, near Dallas, 26 March 1901, *Reverchon 2533* (MBG, NY); Grapeland, Houston Co., 28 May 1917, *E. J. Palmer 12056* (MBG); Grapeland, 8 June 1920, *Tharp 838* (G, NY, US); Livingston, Polk Co., 10 April 1914, *E. J. Palmer 5185* (MBG); Sabine River, 25 km. north of Orange, 18 April 1899, *Bray 65* (US); Dayton, Liberty Co., 21 May 1917, *E. J. Palmer 11979* (MBG); sandy open ground, near Conroe, Montgomery Co., 15 April 1929, *E. J. Palmer 33319* (G, MBG, NY); Houston, Feb. 1842, *Lindheimer* (G); woods, Houston, 6 April 1872, *Hall 435* (MBG, NY, P, US); Houston, *Fisher* (MBG), *33*, *40*, *47*, *707* (US); Galveston, *Van Huff* (MBG).

COLORADO: Rocky Mountains, lat. 40–41′, 1868, *Vasey* (G, MBG).

Verbena canadensis is one of the most easily recognized of the North American species belonging to the section *Glandularia*. It has a large corolla with tube about twice as long as the calyx and, at maturity, an elongated spike with somewhat remote fruits and conspicuous calyx-teeth. The leaves are variously lobed or cleft. Although these variations have been used at sundry times to segregate species, they do not seem to be constant nor are they supported by definite geographic ranges, hence scarcely merit recognition.

36. V. elegans HBK. Nov. Gen. et Sp. **2**: 273. 1818.

V. moranensis Willd. ex Spreng. Syst. **2**: 750. 1825.

V. canadensis subsp. *elegans* Thell. Fl. Advent. de Montpellier, 428. 1912.

V. canadensis var. *Ehrenbergii* Thell. *l. c.*

Stems prostrate-decumbent, tending to root at the older nodes, more or less branched, sparsely hispidulous-hirsute; leaves lanceolate-ovate with cuneate base narrowed into a margined petiole, 2–5 cm. long, incised-pinnatifid or trifid with the divisions less deeply cleft, somewhat appressed-hirsute on both surfaces,

dark green above, lighter beneath, often with branches or fascicles of smaller leaves in the axils; spikes few-flowered, pedunculate, terminal, fascicle-like; bracts mostly one-half to two-thirds as long as the calyx, lanceolate, attenuate, glandular-hirsute, ciliate; calyx 8–10 mm. long, glandular-hirsute, teeth short, subulate and unequal; corolla-tube 15–18 mm. long, finely but sparsely pubescent without, throat gibbous; corolla-limb 10–12 mm. wide; nutlets subcylindrical, 3.5–4 mm. long, reticulate-scrobiculate chiefly on the upper half, lower part striate; commissural face muriculate.

Distribution: southern Mexico.

Specimens examined:

MEXICO:

HIDALGO: Sierra de Pachuca, 2700 m. alt., 22 July 1898, *Pringle 6908* (ANSP, F, G, MBG, NY, P, US); Sierra de Pachuca, 21 and 22 July 1901, *Rose & Hay 5556* (US); mountains, Pachuca, July 1905, *Purpus 1433* (MBG, P); between Pachuca and Real del Monte, 19 July 1905, *Rose, Painter & Rose 8668* (NY, US); Real del Monte, 9 May 1910, *Clokey* (MBG); Moran, *Humboldt & Bonpland 4063* (Bot. Mus. Berl.-Dahl. TYPE of *V. moranensis*, MBG phot.); under oaks and firs, Sierra de Ajusco, ca. 2800 m. alt., 26 Aug. 1902, *Pringle 11092* (F, G, MBG, NY, US).

MEXICO: lomas de Santa Fe, Aug. 1927, *Lyonnet 173* (US).

VERA CRUZ: near Chila, Distr. Ozuluama, April 1888, *Seler 723* (G).

OAXACA: Tehuantepec, 1906, *Gandoger* (MBG).

The above species is related to *V. canadensis* but is easily separable by its slender more or less prostrate habit, few-flowered compact spikes, and shorter calyx-teeth. The nutlets of the two are about the same size, but the reticulations in *V. elegans* are a little coarser than those in the more northern species.

36a. Var. **asperata** Perry,[23] n. var.

Stems decumbent-ascending, hirsute-hispid; leaves variously cleft or lobed; spikes dense, many-flowered; calyx glandular, hispidulous-hirsute, teeth a little longer than in the species.

Distribution: Sonora and Chihuahua to San Luis Potosi.

Specimens examined:

MEXICO:

SONORA: Sierra Madre, 15 Dec. 1890, *Lumholtz 445* (G); Badehuachi, 2 Dec. 1890, *Lumholtz 446* (G); Hermosillo, 1888, *M. A. Crawford* (G).

[23] Var. **asperata** Perry, var. nov., caules ascendentes hirsuto-hispidi; foliis bipinnatifidis vel multifidis; spicis densis multifloris; calyce glanduloso hispidulo-hirsuto.—Collected at San Antonio, Coahuila, Mexico, 31 Aug. 1848, *Gregg 355* (MBG), TYPE.

CHIHUAHUA: southwestern Chihuahua, Aug.–Nov. 1885, *Palmer 295* (G, US).
DURANGO: San Ramon, 21 Apr.–18 May 1906, *Palmer 191* (G, MBG, NY, US).
COAHUILA: Sierra de Parras, Oct. 1910, *Purpus 4974* (F, G, MBG, US); 72 km. east of Saltillo, July 1880, *Palmer 1052* (G, US); San Antonio, 31 Aug. 1848, *Gregg 355* (MBG TYPE); Sierra Encarnaciore, 28 July 1896, *Nelson 3896* (US).
SAN LUIS POTOSI: near Morales, 1876, *Schaffner 716* (G); near San Luis Potosi, 1878, *Parry & Palmer 720* (ANSP, F, MBG, US); Alvarez, 5–12 Sept. 1902, *Palmer 51* (F, G, MBG, NY, US).

This variety, as compared with the species, is stouter and more erect with coarser pubescence and larger spike. *Palmer 191* differs from the other collections in having very shallowly lobed ovate leaves. *Parry & Palmer 720* shows much variation in pubescence, some plants being scabrous, others scarcely so at all. *Purpus 4974* is lacking the coarse pubescence but appears more closely allied here than elsewhere.

37. V. maritima Small, Bull. N. Y. Bot. Gard. **3**: 436. 1905.

Stems branched at base, decumbent or prostrate, sparingly pubescent or glabrate; leaves cuneate to orbicular-ovate, 1–4(–6) cm. long, tapering into a margined petiole, incised-dentate or somewhat lobed, sparsely pubescent or glabrate on both surfaces; spikes terminal, pedunculate, fascicle-like in anthesis, becoming elongate in fruit; bracts linear-lanceolate, about one-half as long as the calyx, acuminate, pubescent, ciliate; fruiting calyx 10–13 mm. long, appressed-pubescent, often glandular, teeth short, slender, subulate; corolla-tube at least one-half longer than the calyx, pubescent without; corolla-limb 10–15 mm. broad; anthers with or without glands; nutlets subcylindric with broadened base, 4 mm. long, scrobiculate; commissure narrow, muricately scabrous.

Distribution: Florida.
Specimens examined:
FLORIDA: sandy ridges bordering the ocean, eastern Florida, *Curtiss 1963* in part (G, MBG, NY); sandy soil, Merritt's Island, 9 Dec. 1929, *Moldenke 219a* (NY); near Cape Canaveral, 15 July 1896, *Curtiss 5706* (G, MBG, NY, P, US); Cape Canaveral, 2–5 April 1904, *Burgess 638* (NY); Fort Pierce, 8–9 April 1904, *Burgess 713* (NY); sand dunes, Hobe Sound, 19 March 1921, *Randolph 52* (G); West Jupiter, 10 April 1904, *Burgess 783* (NY); near beach, Palm Beach, 19 Nov. 1914, *Small 2124* (NY); dry hammock south of Palm Beach, 1 May 1918, *Small 8509* (NY); beach opposite Miami, Nov. 1904, *Small 2100* (NY); opposite Miami, Feb. 1911, *Small, Carter & Small 3311* (NY); Cape Florida, 29 March 1904, *Britton 296* (NY); pine lands, Small Island, northwest of Perrine, 16 Jan. 1909, *Small & Carter 2994* (NY);

sandy soil, Redlands, 2 Feb. 1930, *Moldenke 549* (MBG, NY); sandy soil, Golden Beach, 10 Feb. 1930, *Moldenke 586* (MBG, NY); Camp Jackson, 25 March 1904, *Britton 220* (F, NY); Everglades, west of Camp Jackson, Dade Co., 6–9 May 1904, *Small & Wilson 1961* (NY); Royal Palm Hammock, 20 Feb. 1915, *Small & Small 5422* (NY); Paradise Key and vicinity, 21–29 Sept. 1917, *Safford & Mosier 210* (US); Hammer Key, Everglades, 12 May 1918, *Small 8594, 8599* (NY); in sand near Cocoa Beach, 16 March 1930, *O'Neill 6309* (MBG, US); between Cutler and Longview Camp, 9–12 Nov. 1903, *Small & Carter 1077* (NY).

This native of the sand dunes and the hammocks of Florida resembles *V. canadensis* in inflorescence, but is readily distinguished by the creeping habit and the cuneate or orbicular-ovate leaves.

38. V. tampensis Nash, Bull. Torr. Bot. Club **23**: 104. 1896.

Stems erect from a decumbent or creeping base, pubescent or glabrate; leaves ovate to oblong-ovate, 2–7 cm. long, 1.5–4 cm. broad, truncate at base, tapering into a margined petiole (2 or more cm. long), coarsely serrate-dentate or shallowly incised, strigillose or glabrate on both surfaces, paler beneath; spikes pedunculate, fascicle-like in anthesis, becoming elongated in fruit; bracts linear-subulate, about one-half as long as the calyx, strigillose, ciliate; fruiting calyx 12–13 mm. long, strigillose, lobes very slender, subulate, unequal; corolla-tube somewhat longer (about 2–4 mm.) than the calyx, pubescent without; corolla-limb 10–12 mm. broad; anthers glandless or with a minute gland on the connective of each of the upper pair; schizocarp at maturity slightly constricted along the lines of cleavage; nutlets subcylindrical with broadened base, 4 mm. long, reticulate-scrobiculate above, striate toward base; commissure minutely scabrous.

Distribution: Florida.

Specimens examined:

FLORIDA: without locality, 1842–49, *Rugel 305* (F, MBG, NY, US); Daytona, 24 Jan. 1907, *Mell* (MBG); hammock south of Daytona, 8 May 1918, *Small 8686* (NY); pine lands east of Eustis, 7 May 1918, *Small 8469* (NY); Titusville, 31 March 1914, *Mattern* (US); dry sandy soil along roadside, 3 km. east of Fort Christmas, Orange Co., 9 Dec. 1929, *Moldenke 212* (MBG, NY); hammock along Indian River, Cocoa, 9 May 1918, *Small 8732* (NY); low open woods, Indian River, June, *Curtiss 1963* in part (G, MBG, NY, US); Okeechobee region, Brevard Co., 18 April 1903, *Fredholm 5804* (G); above Fort Lauderdale, 12 March 1920, *J. P. Young 737* (US); Indian River at Biscayne Bay, 1874, *Palmer 6433* (MBG); Tampa, May 1876, *Garber* (US); Tampa, 24 Aug. 1895, *Nash 2470* (G, NY), TYPE collection; Tampa, 7 March 1898,

Pollard (US); St. Petersburg, April 1921, *Beckwith 772* (US); Palmetto, 8 May 1900, *Tracy 6650* (G, MBG, NY, US); Braden River, 13 km. southeast of Manatee, 13 June 1918, *Barrett 13* (US); dry sandy soil north of Venice, 23 April 1930, *Moldenke 1039* (MBG, NY); Owanita, Lee Co., 18 March 1907, *W. Kellogg* (G); thicket along river, Pondilla, Lee Co., 8 March 1927, *Standley* (US).

Verbena tampensis, apparently endemic in peninsular Florida, is very similar in habit to *V. canadensis*. It differs in having more shallowly incised or dentate leaves, a strigillose calyx, slightly longer nutlets, and essentially glandless anthers. The nutlets are enlarged at the base somewhat more than those of closely related species.

39. V. tumidula Perry,[24] n. sp.

Stems 15–20 cm. long, decumbent-ascending, branching, pilose-hirsute; leaves broadly ovate with cuneate base narrowed into a margined petiole, 2–4 cm. long, trifid with segments incised or coarsely crenate-dentate, appressed-pubescent or strigillose above, hirtellous beneath; spikes short-pedunculate, protruding slightly beyond the uppermost leaves, compact; bracts ovate-lanceolate, acuminate, not exceeding the calyx in length, ciliate; mature calyx 8–9 mm. long, inflated at base, hirsute, finely glandular, teeth subulate, 1.5 mm. long; corolla-tube about 11 mm. long, puberulent without; corolla-limb 8–10 mm. broad; anthers not glandular; nutlets 3 mm. long, dorsal surface reticulate-scrobiculate, lateral surfaces ventricose and smooth; commissural face almost smooth.

Distribution: Texas and New Mexico.

Specimens examined:

TEXAS: "from W. Texas to El Paso, New Mexico," May–Oct. 1849, *Wright 455* (G, US); Barksdale, 7 May 1918, *E. J. Palmer 13512* (MBG TYPE).

NEW MEXICO: collection of 1851–2, *Wright 1503* in part (G, NY).

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[24] **V. tumidula** Perry, spec. nov., herbacea; caulibus decumbentibus vel ascendentibus ramosis piloso-hirsutis; foliis late ovatis basi cuneata in petiolum alatum contractis trifidis segmentis inciso- vel grosse crenato-dentatis subtus hirtellis supra adpresso-pubescentibus vel strigosis; spicis breviter pedunculatis paulo exsertis; bracteis ovato-lanceolatis acuminatis ciliatis calyce fere paulo brevioribus; calyce 8–9 mm. longo basim inflato hirsuto et subtiliter glanduloso; calycis dentibus 1.5 mm. longis; corollae tubo circiter 11 mm. longo extus puberulo; corollae limbo 8–10 mm. lato; connectivo antherarum superiorum inappendiculato; coccis subovoideis 3 mm. longis dorso reticulato-scrobiculatis lateribus ventricosis et glabris; commissura subtiliter muriculata.—Collected at Barksdale, Texas, 7 May 1918, *E. J. Palmer 13512* (MBG), TYPE.

This species undoubtedly belongs to the section *Glandularia*, although apparently the anthers are glandless. Superficially, it resembles *V. Gooddingii* var. *nepetifolia*, but the spikes are not so large nor so showy. Its distinctive characters are the ventricose nutlets and the inflated fruiting calyx. The bracts, too, are broader and shorter than those of nearly related species of this group.

40. V. bipinnatifida Nutt. Jour. Acad. Nat. Sci. Phila. **2**: 123. 1821; Schauer in DC. Prodr. **11**: 553. 1847.

Glandularia bipinnatifida Nutt. Trans. Am. Phil. Soc. N.S. **5**: 184. 1837.

More or less diffusely branched from the base; stems loosely ascending, occasionally rooting at the lower nodes or from subterranean branches, hispid-hirsute; leaves petiolate, blades 2–6 cm. long, bipinnately parted or tripartite with divisions more or less bipinnatifid, lobes linear or oblong, appressed-hirsute on both surfaces, margin at times revolute; spikes pedunculate, fascicle-like in anthesis, becoming elongate in fruit; bracts mostly longer than the calyx, linear-subulate, hispid-hirsute, ciliate; fruiting calyx 8.5–10 mm. long, pubescent, hispid-hirsute along the nerves, lobes very slender, subulate-setaceous from a broader base, unequal; corolla-tube about one-half longer than the calyx, pubescent without; corolla-limb 8–10(–12) mm. broad, lobes emarginate; nutlets cylindric with slightly broadened base, mostly 3 mm. long, reticulate-scrobiculate above, striate toward the base; commissure muricately scabrous.

Distribution: South Dakota to Alabama, westward to Arizona and northern Mexico.

Specimens examined:

ALABAMA: between Cahaba and Beloit, Dallas Co., 26 April 1927, *Harper 15* (G, NY, US); on limestone outcrops along small creeks, near Demopolis, Marengo Co., 14 May 1925, *E. J. Palmer 27209* (MBG); Spring Hill, 1918, *Graves 536, 1946* (MBG).

MISSISSIPPI: Ocean Springs, 1892, *Skehan 47* (G).

LOUISIANA: vicinity of Alexandria, 19 May 1899, *Ball 401* (G, MBG, NY, US); Cotes Blanches, St. Mary Co., 17 July 1893, *Langlois* (MBG, US).

MISSOURI: prairies, Upper Missouri, 21 June 1839, *Geyer* (US); Courtney, 6 June 1894, *Bush 351* (G, MBG); Courtney, 13 June 1906, *Bush 4029* (G, MBG, NY, US).

ARKANSAS: "Red River," *Nuttall* (G, NY), TYPE collection; dry gravelly hills, Fulton, Hempstead Co., 17 June 1915, *E. J. Palmer 8045* (MBG); near Homan, 10

June 1898, *Eggert* (MBG); along railroads, Miller Co., 19 June 1908, *Eggert* (NY); Texarkana, Aug. 1880, *Letterman* (MBG, NY).

South Dakota: Fort Pierre, *Nicollet's Northwest Expedition* (US); Pierre, 2 Sept. 1891, *T. A. Williams* (MBG, NY); near McClure, June 1910, *O. E. White* (MBG); Kennebec, Lyman Co., 1 July 1914, *Over 3177* (US); Pine Ridge Reservation, Washabaugh Co., 22 Aug. 1911, *Visher 2132* (F, NY); White River, 16 July 1896, *T. A. Williams* (NY); White River flood plain, 4 Aug. 1914, *Over 2103* (US); White River Valley, Shannon Co., 8 July 1911, *Visher 2177* (NY); Fall River Falls, 18 June 1892, *Rydberg 935* (G, NY, US).

Nebraska: Spencer, Boyd Co., 25 July 1893, *Clements 2776* (G, US); Callaway, 4 July 1901, *Bates* (G).

Kansas: Cloud Co., 19 May 1888, *Carleton* (MBG); near Osborne City, 19 May 1894, *Shear 38* (G, NY, US); Manhattan, 24 May 1901, *A. Nelson 8245* (G, MBG, NY, US); plains, Ellis Co., 16 July 1895, *Hitchcock 393* (G, MBG, NY, US); Smoky Hill, June 1867, *Parry 157* (G, MBG); vicinity of Hays, 20 July 1929, *Rydberg & Imler 1212* (NY), *1253* (MBG, NY); prairies, Medicine Lodge, 12 Sept. 1890, *Smyth 306* (US); Morton Co., July 1891, *Carleton 177* (US); vicinity of Richfield, 20 Sept. 1912, *Rose & Fitch 17105* (US).

Oklahoma: Vinita, 3 Aug. 1877, *Gurney & Monell* (MBG); Grant Co., 20 June 1899, *White 197* (MBG); Woods Co., 29 June ?1899, *White 165* (MBG); near Alva, Woods Co., 28 Sept. 1913, *Stevens 2850* (G); near Whitehorse, 31 May 1913, *Stevens 699* (G, MBG, NY, US); about 17 km. north of Boise City, Cimarron Co., 22 Aug. 1927, *Stratton 449* (MBG); near Shattuck, Ellis Co., 20 May 1914, *Clifton 3085* (G, P); Hollis, Harmon Co., 21 June 1913, *Stevens 1108* (G); 10 km. southwest of Hollis, 6 Aug. 1927, *Stratton 317* (MBG); vicinity of Fort Sill, 27 April 1916, *Clemens 11751* (MBG); on false Washita between Fort Cobb and Fort Arbuckle, 1868, *Palmer 47* (NY); Arbuckle Mountains, Davis, 29 Oct. 1914, *Emig 395* (MBG); near Davis, 23 June 1917, *Emig 788* (MBG); Mannsville, Johnston Co., April 1916, *Griffith 3456* (G); Price's Falls, Murray Co., 30 April 1926, *Stratton 10* (MBG); near Crusher Spur, Murray Co., 11 April 1913, *Stevens 14* (G, MBG, NY, US); near Camp, Texas Co., 12 May 1913, *Stevens 427* (G); Caddo, 22 June 1891, *Sheldon* (MBG), *48* (US).

Texas: without data, *Lindheimer 232* (MBG), *289* (F, G, MBG, NY, US), *307* (G); Canadian, Hemphill Co., 10 Aug. 1900, *Eggert* (MBG); Canadian, July 1903, *Howell 111* (US); vicinity of Terrell, Kaufman Co., 4 May 1904, *Tyler* (US); Dallas, *Reverchon 739* (MBG, US), *1962* (F, G, MBG, NY, US); Dallas, *Reverchon* (G, NY, US); Dallas, 22 June 1899, *Eggert* (MBG); dry ground, near Garland, 24 June 1899, *Eggert* (MBG); Fort Worth, *Ruth 107* (F, G, MBG, NY, US); Weatherford, 26 May 1902, *Tracy 7999* (F, G, MBG, NY, US); Corsicana, Navarro Co., 1 June 1915, *E. J. Palmer 7821* (MBG); near Granbury, Hood Co., 4 May 1900, *Eggert* (MBG); Granbury, 4 Sept. 1914, *E. J. Palmer 6510* (MBG); near Abilene, 7 June 1900, *Eggert* (MBG); Abilene, 19 May 1902, *Tracy 8000* (F, MBG); Killeen, 1 Oct. 1891, *Ward* (US); Walker Co., 6–12 May 1910, *Dixon 561* (F, P); near Austin, Travis Co., 18 April 1929, *E. J. Palmer 33389* (G, MBG); Crab Apple Creek, Gillespie Co., *Jermy 183* (MBG); about 25 km. west of San Felipe, March 1844, *Lindheimer 146* (MBG); San Marcos, 11 June 1897, *Trelease* (MBG); Comanche Spring, New Braunfels, *Lindheimer 1072, 1073* (F, G, MBG, NY, US); northwest of New Braunfels, 14 Sept. 1913, *Pennell 5444* (NY); limestone soil mixed with sand, near Bracken, *Groth 30* (F, G, NY, US); Rock Springs, 17 April 1930, *Jones 26228* in part (MBG); Del Rio, 18 April 1930, *Jones 26229* in part (P); Fort Clark, Kinney Co., *Mearns 1252, 1274, 1394* (US); Eagle Pass, Rio Bravo del Norte, Feb.–March 1852, *Schott*

(NY); San Antonio de Bexar, Feb. 1828, *Berlandier 1449=189* (G); between Trinity River and Bexar, June 1828, *Berlandier 429=?1749* (G); San Antonio, 4 April 1901, *Eggert* (G); San Antonio, 1897, *Wilkinson 9* (MBG); San Antonio, 15 Aug. 1906, *Ball 909* (US); vicinity of San Antonio, April 1919, *von Schrenk* (MBG); San Antonio to Austin, 18 April 1925, *Small & Wherry 11968* (NY); 16 km. west of San Antonio, 8 June 1931, *Moore & Steyermark 3001* (MBG); along Trinity River, near Liberty, 11 April 1925, *Small & Wherry 11781* (NY); Columbia, 27 March 1900, *Bush 449* (MBG, NY, US); Columbia, 3 May 1900, *Bush 205* (MBG, US); Cuero, 22 March 1907, *Howell 308* (US); prairies, near Victoria, 10 April 1900, *Eggert* (MBG); Victoria, 27 April 1905, *Maxon 3808* (US); Victoria, 7 March 1916, *E. J. Palmer 9098* (MBG); from Goliad to Bexar, May 1834, *Berlandier 2428=998* (G, MBG).

?Montana: sandy soil along Yellowstone and upper Missouri, 1853–4, *Hayden* (MBG).

New Mexico: without data, 1850–2, *Wright 1502* (G, NY, US), *1504* in part (ANSP); below Doñana, *Parry, Bigelow, Wright, Schott* (NY); Santa Fe, 20 July 1898, *Earle 84* (MBG, NY); Roswell, Aug. 1900, *Earle & Earle 526* (MBG, NY).

Arizona: Bill Williams Mountain, 22 July 1898, *MacDougal 317* (ANSP, F, G, NY); by streams of Santa Catalina Mountains, 13 April 1881, *Pringle* (G); Santa Rita Mountains, 31 July 1927, *Peebles, Harrison & Kearney 4549* (US); Miller's Canyon, Huachuca Mountains, July 1909, *Goodding 251, 495* (G, NY); road to Rustler's Park, Chiricahua Mountains, 18–19 June 1930, *Goodman & Hitchcock 1211* (MBG); Barfoot Park, Chiricahua Mountains, 31 Aug. 1906, *Blumer 1345* (F, G, MBG, NY).

Mexico: Chihuahua: near Colonia Garcia, 21 July 1899, *Townsend & Barber 139* (F, G, MBG, P, US); near Colonia Garcia, 1899, *Nelson 6117* (G, US); Round Valley, Sierra Madre, 17 Sept. 1903, *Jones* (P).

In the specimens from Arizona and Mexico, it should be noted that the pubescence is hispidulous and the spikes at maturity are, for the most part, dense rather than elongated.

The typical form of the species is very easily recognized by the hispid-hirsute pubescence, particularly of the inflorescence, the lack of glands, the long floral bracts, the elongating spike, the deeply cut leaves, and a rather coarse habit. Apparently it intergrades with *V. ciliata* in northern Mexico, with *V. ambrosifolia* in New Mexico, and at times with *V. canadensis* in the southwestern part of its range. Nevertheless, in spite of the many intermediate phases, it seems preferable to maintain each group as specific entities.

40a. Var. **latilobata** Perry,[25] n. var.

Leaves trifid with the segments remotely incised or lobed,

[25] Var. **latilobata** Perry, var. nov., folia trifida; segmentis grosse incisis lobisve supra strigosis subtusque praesertim in nervis et venis hirtellis hirsutisve; spicis maturitate densis vel elongatis.—Collected between San Pedro and Fronteras, Sonora, Mexico, 20–24 Sept. 1890, *Hartman 906* (G), type.

strigillose above, hirtellous-hirsute, especially along the veins beneath; spike compact or somewhat elongated in age; bracts variable in length, usually equalling or exceeding the calyx; floral and nutlet characters as in the species.

Distribution: southern Arizona and northwestern Mexico.
Specimens examined:
ARIZONA: Galiuro Mountains, 9 July 1894, *Toumey* (NY); Bisbee, Oct. 1908, *Goodding 37* (NY); Flagstaff, 17 June 1887, *Mearns* (NY); Fort Huachuca, Aug. 1893, *Wilcox* (NY); Fort Huachuca, Sept. 1894, *Wilcox* (US); Huachuca Mountains, 29 June–5 July 1903, *Griffiths 4833* (US); Huachuca Mountains, 3 Sept. 1903, *Jones* (P); Miller's Canyon, Huachuca Mountains, 26 Aug. 1910, *Goodding 883* (G, NY); Santa Rita Mountains, 20 Sept.–4 Oct. 1902, *Griffiths & Thornber 159* (US); Santa Rita Mountains, 24 Aug. 1903, *Jones* (P, US).
MEXICO:
CHIHUAHUA: at base of Mt. Mohinora, about 13 km. from Guadalupe y Calvo, 23–31 Aug. 1898, *Nelson 4856* (G, US); Colonia Juarez, Sierra Madre Mountains, 11 Sept. 1903, *Jones* (P); San Diego Canyon, Sierra Madre Mountains, 16 Sept. 1903, *Jones* (P); without data, *Wright 1503* in part (G, NY).
SONORA: between San Pedro and Fronteras, 20–24 Sept. 1890, *Hartman 906* (G TYPE); San Pedro, 14 Sept. 1890, *Hartman 880* (G); Cananea, 27 Sept. 1908, *Donnelly* (P); Cananea, 20 Aug.–1 Sept. 1914, *Murdoch* (F).
DURANGO: without data, *Garcia 331* (US); Sierra Madre, west of Durango, Sept.–Oct. 1881, *Forrer* (F).

The variety differs from the species chiefly in foliar characters.

41. V. ambrosifolia Rydb. in Small, Fl. Southeast. U. S. ed. 1, 1011. 1337. 1903, and ed. 2, 1913.

More or less diffusely branched from the base; stems loosely decumbent-ascending, somewhat hirsute; leaves short-petiolate, blades 2–6 cm. long, bipinnatifid with the ultimate segments lanceolate, appressed-hirsute on both surfaces, margin slightly revolute; spikes pedunculate or subsessile, fascicle-like in anthesis, somewhat elongating in fruit; bracts a little shorter than the calyx, lance-subulate, hirsute, ciliate; fruiting calyx 8–9 mm. long, glandular, pubescent, hirsute particularly along the nerves; teeth subulate; corolla-tube protruding one-third to one-half beyond the calyx, pubescent without; corolla-limb 6–8(–10) mm. wide; nutlets subcylindric often with slightly broadened base, 2.5–3 mm. long, reticulate-scrobiculate above, striate below; commissure muricately scabrous.

Distribution: Oklahoma and Texas to Arizona and northern Mexico.
Specimens examined:
OKLAHOMA: near Kenton, Cimarron Co., 15 May 1913, *Stevens 484* (G, MBG).

TEXAS: 16 km. east of Comstock, 9 June 1931, *Moore & Steyermark 3009* (MBG); Alpine, 30 May 1928, *E. J. Palmer 34240* (NY); prairies near Marfa, 14 May 1901, *Eggert* (MBG); foothills below McKittrick Canyon, 23 July 1931, *Moore & Steyermark 3622* (MBG); Sierra Blanca, May 1913, *Orcutt 6096, 6197* (MBG); northeast base of Quitman Mountains, near Sierra Blanca, 4 July 1921, *Ferris & Duncan 2474* (MBG).

COLORADO: New Windsor, 18 June 1905, *Osterhout 3165* (G); Boulder, July 1891, *Penard 348* (NY); Denver, July 1892, *Eastwood* (NY); South Denver, 8 June 1891, *E. C. Smith* (MBG); foothills, below Colorado Springs, 29 May 1878, *Jones 122* (P); Cañon City, May 1871, *Brandegee* (MBG); Pueblo, 10 July 1873, *Greene 45* (G); road to Walsenburg, Pueblo, 13 June 1917, *E. L. Johnston 986* (MBG); mesas near Pueblo, 14 May 1900, *Rydberg & Vreeland 5676* (NY); Rocky Ford, Otero, 8 June 1900, *Osterhout* (G fragm., NY TYPE); vicinity of La Junta, 26 Sept. 1913, *Rose & Fitch 17504* (MBG, US).

NEW MEXICO: collection of 1847, *Fendler 586* in part (ANSP, F, G, MBG, US); south of Raton on the road to Taos, 30 June 1929, *Mathias 545* (MBG); Tierra Amarilla, Rio Arriba Co., 18 April–25 May 1911, *Eggleston 6644* (US); Ojo Caliente, near Fairview, 18 July 1904, *Wooton* (US); in canyon near Santa Fe, 29 June 1846, *Wislizenus 525* (MBG); about Santa Fe, 8–9 Sept. 1881, *Engelmann* (MBG); near Pecos, San Miguel Co., 15 Aug. 1908, *Standley 4951* (F, G, MBG, NY, US); Pecos, 18 June 1927, *Arsène 18615* (P); vicinity of Las Vegas, *Anect 100, 143* (G), *179* (NY), *Arsène 18793* (P); Nara Visa, 21 April 1911, *Fisher* (MBG); vicinity of Bernalillo, 12 July 1926, *Arsène & Benedict 16306* (MBG); vicinity of Albuquerque, 6 Oct. 1913, *Rose & Fitch 17801* (MBG, US); near Albuquerque, 21 June 1926, *E. J. Palmer 31192* (MBG); between Carrizozo and Socorro, 21 July 1928, *Wolf 2890* (P); Socorro, May 1881, *Vasey* (F, MBG, US); White Mountains, Lincoln Co., Aug. 1897, *Wooton 363* (G, MBG, NY, P); Capitan, 8–19 May 1902, *Earle 638* (NY); Lincoln, 31 July 1900, *Earle & Earle 236* (MBG, P); South Spring, 2–4 May 1903, *Griffiths 4244* (US); Mimbres River, Grant Co., 20 Aug. 1904, *Metcalfe 1231* (MBG); plains south of White Sands, Doña Ana Co., 28 Aug. 1897, *Wooton 642* (MBG, NY, US); Queen, 2 Aug. 1909, *Wooton* (MBG, US); Organ Mountains, Doña Ana Co., 16 Aug. 1893, *Wooton* (MBG).

ARIZONA: Warsaw Mill, Pima Co., 3 Dec. 1893, *Mearns 2677* (MBG, NY, US); about 3 km. south of Holbrook, 17 June 1901, *Ward* (NY, US); Little Colorado, 1869, *Palmer* (US).

MEXICO:

CHIHUAHUA: Candelaria Mountains, 1911, *Stearns 104* (US).

NUEVO LEON: Monterey, 17–26 Feb. 1880, *Palmer 1050* (MBG, US).

COAHUILA: about 9 km. east of Saltillo, April 1880, *Palmer 1050* (G); Sierra Mojada, 20 April 1892, *Jones 634* (P); Sabinas, 21 May 1902, *Nelson 6789* (NY, US); Carneros Station, 31 May 1890, *Pringle 3467* (F); fields near Carneros Station, 10 Nov. 1904, *Pringle 13157* (F, G, US).

An examination of the type specimens of *V. ambrosifolia* and *V. Wrightii* reveals differences probably sufficient to suggest distinct but closely related species. Typically the former is characterized by long calyx-teeth and coarser pubescence; whereas the latter has short calyx-teeth, finer and somewhat viscid pubescence. On the other hand, a study of the aggregate

specimens of the two shows a high variability in the combination of these characters; moreover, their geographic ranges practically coincide. For these reasons, *V. ambrosifolia* is maintained as a species with very doubtful status.

41a. Forma **eglandulosa** Perry,[26] new form.

Differing from the species only in the more hirsute-hispid pubescence of the flower and the lack of glands.

Distribution: Texas to Arizona, and Sonora, Mexico.

Specimens examined:

TEXAS: "El Paso to Monument no 53," Sept. 1892, *Wagner 974* (US).

NEW MEXICO: Albuquerque, 21 June 1926, *E. J. Palmer 31153* (MBG); 8 km. west of Magdalena, 20 July 1904, *Wooton 2835* (US); Organ Mountains, 14 July 1897, *Wooton* (US); mesa just west of Organ Mountains, 13 June 1906, *Standley* (US); Santa Rita, 1 Aug. 1911, *Holzinger* (MBG TYPE, US); Deming, 13 July 1917, *Munz 1231* (P); Los Playas, 1854–5, *Antisell 186* (NY); near White Water, 11 Sept. 1893, *Mearns 2278* (US); Animas Valley, 2 Oct. 1893, *Mearns 2486* (US).

ARIZONA: Douglas, 13 May 1915, *Carlson* (G, US); Santa Catalina Mountains, 15 Sept. 1896, *Toumey* (NY, US); Dragoon, 18 July 1920, *W. W. Jones 185* (G); Cochise, 12 Oct. 1900, *Griffiths 1919* (NY).

MEXICO: SONORA: San Pedro River, 15 Oct. 1892, *Mearns 1138* (US).

This is a phase of the species lacking glands and only separable from *V. bipinnatifida* by the short bracts.

42. V. Wrightii Gray, Syn. Fl. N. Am. 2[1]: 337. 1878.

Stems usually several from a common base, decumbent-ascending to erect, branched, sparsely hispid-hirsute; leaves subsessile or contracted into a short margined petiole, blades 2–3 (–4) cm. long, bipinnatifid or trifid, with the divisions more or less deeply incised, ultimate segments narrowly lanceolate, hirtellous to hirsute on both surfaces; spikes short-pedunculate, in fruit more or less compact; bracts shorter than the calyx, lanceolate, acute or acuminate, hirsute-ciliate; fruiting calyx 7–9 mm. long, densely glandular, somewhat viscid-pubescent, nerves hirsute, lobes short, subulate, unequal; corolla-tube 11–12 mm. long, pubescent around the throat; corolla-limb 6–8 mm. broad, lobes retuse; nutlets 2.5–3 mm. long, reticulate-scrobiculate above, striate toward the base; commissure muricately scabrous.

[26] Forma **eglandulosa** Perry, forma nova; calyce hirsutiori-hispido eglanduloso.—Collected at Santa Rita, New Mexico, 1 Aug. 1911, *Holzinger* (MBG), TYPE.

Distribution: Texas, Colorado, New Mexico, and Arizona.

Specimens examined:

TEXAS: San Antonio, *Havard* (US); Barstow, 16 April 1902, *Tracy & Earle 61* (F, G, MBG); northeast of Grand Falls, 17 May 1917, *Clawson 13923* (US); near Feodora, Terrell Co., 26 May 1928, *E. J. Palmer 33583* (MBG); Upper Blue Creek Canyon, Chisos Mountains, 1 July 1931, *Moore & Steyermark 3324* (MBG); Fort Davis, 9–12 July 1921, *Ferris & Duncan 2647* (MBG, P); Davis Mountains, 23 April 1902, *Tracy & Earle 162* in part (F, G, MBG, US); foothills, Davis Mountains, 15 April–3 May 1902, *Tracy & Earle 162a* (NY); canyon of Upper Limpia Creek, 10 June 1926, *E. J. Palmer 30672* (MBG); Guadalupe Mountains, 9 Sept. 1916, *Young* (MBG); flats near Van Horn, 13 May 1901, *Eggert* (G, MBG); Vieja Mountain, Oct. 1883, *Havard 97* (G, US); Canutillo, Franklin Mountains, 12 July 1911, *Barlow* (US); mountains near Fronteras, 22 March 1852, *Wright* (MBG, NY), *1504* in part (G TYPE); Hueco Mountains, March 1851, *Thurber 143* (G); about 8 km. north of Shafter, 10 April 1919, *Hanson 551* (MBG, US).

COLORADO: Durango, 20 July 1898, *Baker, Earle & Tracy 531* (G, MBG, P).

NEW MEXICO: without locality, 1851–2, *Wright 1503* in part (MBG); Copper Mines, 28 July 1851, *Bigelow* (NY); Rabbit Ear Creek, 28 June 1846, *Wislizenus 483* (MBG); Las Vegas, 26 June 1895, *Mulford 37* (MBG, NY); hills, Santa Fe, 15 May 1897, *Heller 3536* (G, MBG, P); Sandia Mountains, 6 Sept. 1884, *Jones 457* (P); Sandia Mountains, 28 April 1914, *Ellis 17* (MBG); about 3 km. east of Albuquerque, 1915, *Kammerer 33* (MBG); Albuquerque, Sept. 1884, *Jones* (NY, P); Albuquerque, 5 Sept. 1909, *Rusby* (NY); mountains west of Grant's Station, 2 Aug. 1892, *Wooton* (US); South Camp, Magdalena Mountains, July 1897, *Herrick 704* (US); White Mountains, Lincoln Co., 20 Aug. 1897, *Wooton 364* (G, MBG, P); near Lincoln National Forest, 1903, *Plummer* (US); Vaughn, 10 Sept. 1921, *Harwood* (P); plains, White Sands, Otero Co., 25 Aug. 1899, *Wooton* (US); High Rolls and vicinity, 21–28 May 1902, *Viereck* (ANSP); Alamogordo, 7 April–24 May 1902, *Rehn & Viereck* (ANSP, MBG, P); Kingston, Sierra Co., 9 July 1904, *Metcalfe 1090* (G, MBG, NY, P, US); Gallina's Canyon, Black Range, Grant Co., 17 Aug. 1915, *Pilsbry* (ANSP); Mangas Springs, about 29 km. northwest of Silver City, 11 June 1903, *Metcalfe 126* (G, MBG, P); near Silver City, June 1880, *Greene* (MBG, P); Silver City, 8 May 1919, *Eastwood 8468* (G); Rincon, 16 May 1890, *Jones* (P); Big Burros Ranger Station, Gila Forest, Grant Co., 11 Sept. 1920, *Eggleston 17231* (MBG, NY); Organ Mountains, 8 May 1895, *Wooton* (P); Organ Mountains, 11 June 1906, *Standley* (MBG, US); Filmore Canyon, Organ Mountains, Doña Ana Co., 25 May 1905, *Wooton* (US); Van Pattens, Doña Ana Co., 29 Aug. 1894, *Wooton* (US); Slaughter Canyon, 12–20 Aug. 1924, *Standley 40625* (US).

ARIZONA: Long H. Ranch to St. John's, 6–15 Aug. 1913, *Griffiths 5190* (US); between Springerville and St. John's, Apache Co., 15 Sept. 1917, *Marsh 14224* (MBG).

On account of its strong variability, this species has been exceedingly difficult to define. It was first set apart as an erect annual, with anther-glands as high and almost as large as the anther-cells. In the series of specimens at hand, the anther-glands are neither constant in size nor in height relative to the anther-sacs. The main characters appear to be the glandular somewhat viscid pubescence of the calyx, the very short acute-subulate calyx-teeth, and the somewhat compact spikes.

43. V. ciliata Benth. Pl. Hartw. 21. 1839.

Stems several from a common base, decumbent, branched, hirsute-hispidulous; leaves short-petiolate or subsessile, subbipinnatifid or commonly trifid, with the divisions more or less deeply incised, ultimate segments linear-oblong with slightly revolute margin, hirsute-strigillose on both surfaces; spikes subsessile or short-pedunculate, in fruit more or less compact; bracts a little shorter than the calyx, lanceolate, subulate or acuminate, hirsute-ciliate; calyx 7–8 mm. long, somewhat glandular, hirsute-hispidulous, lobes short, subulate, unequal; corolla-tube 10–12 mm. long, pubescent without; corolla-limb 6–8 mm. broad, lobes retuse; nutlets 2.5–3 mm. long, reticulate-scrobiculate above, striate toward base; commissural faces muricately scabrous.

Distribution: New Mexico, Arizona to southern Mexico.

Specimens examined:

NEW MEXICO: "Upper Corner Monument, parallel 31° 47′," 3 May 1892, *Mearns 108* (G, NY).

ARIZONA: without locality, 1892, *Toumey 305½* (US); Ash Fork, 18 June 1901, *Barber 106* (US); Ash Fork, 20 June 1903, *Griffiths 4757* (US); Aguila, 3 April 1930, *Jones 26231* (MBG, P); Snowflake, 30 July 1897, *Zuck* (US); Pinedale, 1–15 Aug. 1897, *Hough 109* (US); Fort Grant, Bonita, 18 July 1917, *Munz 1249* (P); between Tombstone and Bisbee, 23 May 1928, *Peebles 5353* (US).

MEXICO: without data, *Coulter* (ANSP); without locality, 26 July 1885, *Schumann 1071* (G, US).

SONORA: San Bernardino, Aug. 1852, *Thurber 769* (G).

CHIHUAHUA: Saint Eulalia plains, 26 Sept. 1885, *Wilkinson* (US); highlands near Chihuahua, 28 April 1847, *Gregg* (G, MBG, NY); valley near Chihuahua, 13 Sept. 1846, *Pringle 1117* (F, US); vicinity of Chihuahua, 8–27 April 1908, *Palmer 79* (F, G, MBG, NY, US); vicinity of Madera, 27 May–3 June 1908, *Palmer 281* (G, NY, US).

DURANGO: Valley of Nazas, Bolson de Mapimi, 11 May 1847, *Gregg 632* (MBG); near El Salto, 12 July 1898, *Nelson 4559* (MBG, US); Durango and vicinity, April–Nov. 1896, *Palmer 345* (F, G, MBG, NY, US); Durango, 1 Aug. 1898, *Nelson 4604* (MBG, US); Otinapa, 25 July–5 Aug. 1906, *Palmer 401* (F, G, MBG, NY, US).

COAHUILA: near Saltillo, 1847, *Gregg 57, 257* (MBG); Saltillo, 15–30 April 1898, *Palmer 74* (F, G, MBG, NY, US); Saltillo, 24 Aug. 1926, *Fisher 223* (US); Oro, 18 Aug. 1903, *Rose & Painter 6431* (US); La Ventura, 2–5 Aug. 1896, *Nelson 3920* (US); Parras, March 1905, *Purpus 1095* (NY); Valley of Nazas, 1848–49, *Gregg 26* (MBG); El Toro, near Movano, July 1910, *Purpus 4524* in part (F, MBG).

SAN LUIS POTOSI: near San Luis Potosi, 1876, *Schaffner 717* (ANSP, G); near San Luis Potosi, 1878, *Parry & Palmer 719* (ANSP, MBG).

ZACATECAS: Zacatecas, July 1904, *Kuntze 424* (NY); Hacienda de Cedros, 1908, *Lloyd 159* (US); near Plateado, 3 Sept. 1897, *Rose 2769* (US); near San Juan Capistrano, 19 Aug. 1897, *Rose 2435* (US).

AGUASCALIENTES: near Aguas Calientes, 9 Oct. 1903, *Rose & Painter 7742* (US).

NAYARIT: Tepic, 5 Jan.–6 Feb. 1892, *Palmer 2055* (US); Ixtlan, 19 Feb. 1927, *Jones 23244* (MBG, NY, P).

JALISCO: near Guadalajara, 11 Aug. 1902, *Pringle 11091* (F, MBG, NY, US); near Guadalajara, 23 Feb. 1907, *Safford 1398* (US); Guadalajara, Aug. 1909, *Furness* (F, US); Rio Blanco, June-Oct. 1886, *Palmer 35* (G, NY, US).

GUANAJUATO: Leon, 1839, *Hartweg 176* (G, NY), TYPE collection; Guanajuato, 1894, *Duges 496, 496a* (G); Obregon, 28 July 1926, *Fisher 207* (US).

QUERETARO: near San Juan del Rio, 17 Aug. 1905, *Rose, Painter & Rose 9503* (US); Queretaro, 1910–13, *Arsène & Agniel 10252* (F, G, MBG, NY, US).

HIDALGO: above Pachuca, 23 July 1898, *Pringle 7591* (F, P).

VERA CRUZ: Orizaba, 1853, *Mueller 325, 1209, 1319* (NY); Orizaba, 4 Aug. 1891, *Seaton 150* (F, G, US); Maltrata, Jan. 1883, *Kerber 255* (US); Maltrata, 16 Aug. 1891, *Seaton 391* (F, G, NY, US).

PUEBLA: Cholula, 1 Jan. 1899, *Deam* (F), *86* (G); Tehuacan, *Galeotti 736* (NY, US); near Tehuacan, 8 Sept. 1906, *Rose & Rose 11398* (G, NY, US); vicinity of San Luis Tultitlanapa, July 1908, *Purpus 3407* (G, MBG).

MEXICO: meadows near Lecheria, 12 May 1904, *Pringle 13158* (F, G, US); Valley of Mexico, 1865–6, *Bourgeau 120* (G); Eslava, 15 June 1901, *Pringle 9313* (G, MBG, NY, US); Amecameca, 24 July 1924, *Fisher* (F), *319* (MBG, US); near San Angel, 9 April 1849, *Gregg 648* (MBG).

MICHOACAN: low valley, Zinapecuaro, 2 May 1849, *Gregg 756* (MBG); Querendaro, 28 Oct. 1895, *Seler 1174* (G); Los Reyes, 8–12 Feb. 1903, *Nelson 6858* (US).

COLIMA: volcano of Colima, 14 July 1892, *Jones 686* (P).

OAXACA: Cerro de las Soledad, 20 Nov. 1895, *Seler 1379* (G); Las Sedas, 8 Sept. 1894, *C. L. Smith 221* in part (US).

This is a variable and wide-ranging species closely related to the *bipinnatifida-Wrightii-ambrosifolia* complex and scarcely capable of sharp delimitation. Its best characters are the hirsute-hispid pubescence, the usually sessile compact spike, the medium-short somewhat glandular calyx subtended by a slightly shorter bract. The specimens, *Seaton 150*, *Pringle 9313*, and *Gregg 648*, have typical spikes, but the leaves are small and the stems tend to be repent, suggesting a possible intergradation with *V. teucriifolia*.

43a. Var. **longidentata** Perry,[27] n. var.

Hispidulous-hirsute plant of variable size and more or less open habit; leaves bipinnatifid; calyx-teeth 2–2.5 mm. long.

Distribution: southern Texas, New Mexico, and Tamaulipas.

Specimens examined:

TEXAS: Post, 22 May 1925, *Woolon* (US); Lubbock, 14 May 1930, *Demaree 7685*

[27] Var. **longidentata** Perry, var. nov., planta hispidulo-hirsuta; foliis bipinnatifidis; calycis dentibus 2–2.5 mm. longis.—Collected at Matamoros, Mexico, April 1836, *Berlandier 3020* (MBG), TYPE.

(US); Vista, May 1892, *Trelease* (MBG); woods near Colorado River, near Wharton, 12 April 1925, *Small & Wherry 11834* (NY); hills near San Antonio, 4 April 1901, *Eggert* (MBG); El Jardin, 10 March 1924, *Runyon 630* (US); Laredo, Feb.–March 1913, *Orcutt 5657* (MBG); Corpus Christi, 11 May 1900, *Bailey 258* (US); Corpus Christi, May 1913, *Orcutt 5792* (MBG); Aransas Pass, 1922, *Schulz 845* (US); Kingsville, 25 March 1920, *High 59* (MBG); Brownsville, 4 May 1900, *Bailey 221* (US).

NEW MEXICO: Hagerman, 26 April 1929, *Benke 5046* (F, G, MBG).

MEXICO: TAMAULIPAS: Matamoros, April 1836, *Berlandier 1520* (G), *3020* (G, MBG TYPE, NY).

Scarcely differing from the species except in the relatively very long calyx-teeth and the often somewhat less deeply cleft leaves.

43b. Var. **pubera** (Greene) Perry, n. comb.

V. pubera Greene, Pittonia **5:** 136. 1903.

Plants with more or less prostrate compact habit; ultimate segments of the leaves linear-oblong, margins strongly revolute.

Distribution: Texas to Arizona.

Specimens examined:

TEXAS: Davis Mountains, 23 April 1902, *Tracy & Earle 162* in part (MBG), TYPE collection of *V. pubera;* Sierra Blanca, El Paso Co., 22 May 1913, *Orcutt 6172* (MBG).

NEW MEXICO: low mountains west of San Antonio, 14 April 1908, *Wooton 3849* (US); near Silver City, May 1880, *Greene* (MBG, P); Deming, 29 April 1884, *Jones 3801* (NY, P, US); Deming, 9 April 1930, *Jones 26232* (MBG, P); Lordsburg, 3 July 1891, *Evans* (MBG); east of Lordsburg, 5 May 1930, *Jones 26227* (MBG, P); Hudson Hot Springs, 2 April 1901, *Vreeland 804* (NY).

ARIZONA: Cameron's, 16 June 1929, *Jones* (P); northeast of Flagstaff, 8 Aug. 1922, *Hanson A146* (F, MBG, NY); Peach Springs, 15 June 1930, *Jones 25480* (MBG, P); Dewey, 16 July 1922, *W. W. Jones 180* (G); Taylor, 1 Aug. 1897, *Zuck* (MBG, NY); Chiricahua Mountains, 5 April 1897, *Toumey* (US).

This variety is a low plant with several stems from a common base, short internodes, and a tendency to branch freely. The leaves are more finely dissected than in the species and the margins are more revolute.

44. V. racemosa Eggert, Torreya **2:** 123. 1902.

V. pulchella Greene, Pittonia **5:** 136. 1903.

Stems several from a common base, ascending-erect, branched, pubescent; leaves bipinnatifid or trifid with segments deeply cleft, ultimate segments linear, somewhat pubescent or hirtellous on both surfaces; spikes subsessile, elongate but dense at maturity; bracts scarcely so long as the calyx, lanceolate, acuminate, ciliate; calyx 5–6 mm. long, sparsely glandular-hirtellous, teeth

short, acute-subulate; corolla-tube 7–9 mm. long, puberulent or glabrous without; corolla-limb 5–6 mm. broad; nutlets 2 mm. long, reticulate-scrobiculate almost to base; commissural faces muricately scabrous.

Distribution: Texas, New Mexico?
Specimens examined:
TEXAS: Upton Co., 2 May 1929, *Cory 664* (G); Stockton, June 1881, *Havard* (US); foothills of Davis Mountains, 21 April 1902, *Tracy & Earle 106a* (F, G); low valleys near Sierra Blanca, El Paso Co., 15 May 1901, *Eggert* (G, MBG); Sierra Blanca, 22 May 1913, *Orcutt 6184* (MBG); valley of the Rio Grande below Doñana, *Parry Bigelow, Wright & Schott* in part (US).
NEW MEXICO: without locality, 1851–2, *Wright ?1498* (NY), *1501* (G).

Fine pubescence, short calyx-teeth, small leaves, and elongated profusely floriferous spikes are the distinctive characters of this species. It is probably a close relative of *V. ciliata*.

45. V. Andrieuxii Schauer in DC. Prodr. **11**: 553. 1847.

Stems diffuse; branches procumbent, sub4-angled, hispid; leaves 4 cm. long, cuneate at base, sessile, deeply trifid, rugose with veins impressed above, strigose-hispid on both sides, middle lobe pinnatifid, lateral lobes spreading, lanceolate, acutish, margin incised or entire, subrevolute; spikes terminal and axillary, short-pedunculate, oblong, crowded, hispid, subglandular; bracts one-third shorter than the calyx, subulate-lanceolate; calyx 8–9 mm. long, teeth subulate; corolla-tube one-half longer than the calyx, puberulent, corolla-limb medium; schizocarp one-half the length of the calyx.

Distribution: southern Mexico.
Specimens examined:
Mexico:
?MEXICO: between Mexico and Oaxaca, *Andrieux 138* (DeCandolle Herb. TYPE, F phot., K, MBG phot.).
OAXACA: mountain ridge, west side of valley of Cuicatlan, 10 Nov. 1894, *Nelson 1895* (US); Tieneguilla, 5 April 1895, *L. C. Smith 348* (G); valley of Oaxaca, 2 Oct. 1894, *Nelson 1513* (G, US).

The above description is a close translation of the original. Even with the photograph of the type, the species is difficult to interpret without floral dissections. For the present, it seems preferable to maintain its status, referring here the above somewhat similar collections.

46. V. teucriifolia Mart. & Gal. Bull. Acad. Brux. **11**[2]: 322. 1844.

V. exilis Schauer in DC. Prodr. **11**: 553. 1847.

Stems several from a common base, prostrate or repent, more or less diffusely branched, 4-angled, glabrate or hirtellous; leaves 1.5–2.5 cm. long, cuneate at base, narrowed into a margined petiole, pinnatifid-incised, segments linear-oblong, obtusish, often glabrous or sparsely strigillose on both surfaces, nerves impressed above, subglaucescent beneath; margin slightly revolute; spikes terminal, sessile or short-peduncled, scarcely emerging from the highest leaves, few-flowered; bracts approximately one-half as long as the calyx, lanceolate, acuminate-acute, ciliate; calyx 5–7 mm. long, sparsely hirtellous or occasionally hirsute, lobes short, acute; corolla-tube a little longer than the calyx; corolla-limb 5–7 mm. broad; anther-glands minute; nutlets 2.5–3 mm. long, chiefly reticulate-scrobiculate; commissural face muriculate or almost smooth.

Distribution: Mexico and Guatemala.

Specimens examined:

Mexico:

San Luis Potosi: Huaxalote, *Ehrenberg 131* (Bot. Mus. Berl.-Dahl. type of *V. exilis;* MBG phot.).

Guanajuato: Cerro Leon, June–July 1841, *Liebmann 11329* (US).

Hidalgo: near Real del Monte, 2 June 1899, *Rose & Hough 4484* (US).

Vera Cruz: sand hills, Perote, *Halsted* (NY); Perote, near Jalapa, 1894, *C. L. Smith 1474* (G); peak of Orizaba, June–Oct. 1840, *Galeotti 777* (K), type collection; Vaqueria del Jacal and Orizaba, Oct. 1841, *Liebmann 11328* (US); "Talvare," Feb. 1843, *Liebmann 11330* (US); Boca del Monte, 13 March 1894, *Nelson 196, 223* (US).

Puebla: common in dry volcanic sand, Chalchicomula, 8 April 1890, *Stone* (ANSP); Chalchicomula, 20 Feb. 1892, *J. G. Smith 464* (MBG); near Chalchicomula, 15 March 1894, *Nelson 242* (US); Popocatepetl, 7–8 Aug. 1901, *Rose & Hay 6049* (US).

Mexico: La Cima, Jalapa, Aug. 1904, *Kuntze 23738* (NY); Sierra de las Cruces, Salazar, 13 Aug. 1896, *Harshberger 41* (ANSP, G, US); lava beds, near Eslava, 19 July 1910, *Rusby 124* (NY); near Toluca, 23 June 1889, *Pringle 2927* (F, G); valley of Toluca, 15 Aug. 1892, *Pringle 4180* (ANSP, F, G, MBG, NY, US); San Angel, 12 Aug. 1910, *Orcutt 3551* (F, MBG, US).

Morelos: Toro, 5 Aug. 1924, *Fisher* (F, MBG), *337* (US); Tres Marias, 11 Aug. 1906, *Pringle 13792* (G, US).

Michoacan: Morelia, 9 July 1910, *Arsène* (F).

Oaxaca: Chinantla, May 1841, *Liebmann 11308, 11316* (US).

Central America: Guatemala: near Quezaltenango, 23 June 1882, *Lehmann 1603* (US); Quezaltenango, Oct. 1886, *von Tuerckheim 1068* (ANSP, G, US).

The specimens cited vary greatly in degree of pubescence. The larger number are sparsely hirtellous or strigillose. The following are densely hirtellous-hirsute: *Liebmann 11329, Nelson 196, 223, Smith 1474, Halsted, Smith 464, Nelson 242.*

The Guatemalan collections appear to be conspecific, although both the cilia of the bracts and the trichomes along the nerves of the calyx are somewhat coarser and stiffer than those of the Mexican material. *V. teucriifolia* is a slender plant easily separated from its nearest relatives by its prostrate or repent habit and few-flowered spikes.

46a. Var. **corollulata** Perry,[28] n. var.

Usually finely and densely pubescent; calyx 5 mm. long, spreading-pubescent, lobes very short; corolla inconspicuous, tube barely protruding beyond the calyx, limb 3 mm. broad; nutlets 2.5 mm. long.

Distribution: Mexico.

Specimens examined:

MEXICO:

SAN LUIS POTOSI: region of San Luis Potosi, 1878, *Parry & Palmer 718* (G, MBG TYPE, US), *719* in part (ANSP, F, MBG, US).

ZACATECAS: plains, LaHonda, 18 Aug. 1890, *Pringle 3551* (G); Zacatecas, 1903, *Purpus 137* (US).

HIDALGO: Hacienda Palmar, near Pachuca, 21 July 1905, *Rose, Painter & Rose 8823* (G, NY, US); Telles, Sept. 1910, *Orcutt 4146* (F, MBG).

The variety differs from the species chiefly in its smaller corollas; perhaps it is only a dimorphic form.

47. V. Gooddingii Briq. Ann. Conserv. & Jard. Bot. Genève **10:** 103. 1907.

V. verna var. *fissa* Nelson, Am. Jour. Bot. **18:** 437. 1931.

Stems usually several from a common base, erect or decumbent-ascending, cinereous-green, branched, densely pilose or somewhat villous, often glandular; leaves 3–5 cm. long, tapering at the base into a short margined petiole, 3-cleft, divisions coarsely toothed or incised, cinereous-green, more or less villous-hirsute

[28] Var. **corollulata** Perry, var. nov., planta dense pubescens; calyce 5 mm. longo patenti-pubescente; corolla inconspicua, tubo vix exserto, limbo 3 mm. lato; coccis 2.5 mm. longis.—Collected in the region of San Luis Potosi, Mexico, 1878, *Parry & Palmer 718* (MBG), TYPE.

on both surfaces, midrib and veins slightly prominent beneath, margins scarcely (if at all) revolute; spikes pedunculate, fascicle-like in anthesis, somewhat elongated in fruit; bracts usually a little shorter than the calyx, lanceolate, acuminate, villous-hirsute, long-ciliate; calyx 8.5–11 mm. long, villous-hirsute, more or less glandular, lobes slender, subulate, unequal; corolla-tube very little longer than the calyx, pubescent without; corolla-limb 8–9(–12) mm. wide, segments retuse; nutlets 3(–3.5) mm. long, subcylindric, reticulate-scrobiculate except at the striate base.

Distribution: Utah, Arizona to California, and Lower California.

Specimens examined:

UTAH: southern Utah, 1876, *Johnson* (US).

NEVADA: sandy soil, Charleston Mountains, about 1800 m. alt., May–Oct. 1898, *Purpus 6061* (P, US); Trout Creek, Charleston Mountains, about 1900 m. alt., 1926, *Jaeger* (P); Calientes, about 1400 m. alt., 29 April 1914, *Jones* (P); Kernan, Valley Meadow Wash, 28 April 1902, *Goodding 645* (F, G, MBG, P), TYPE collection.

ARIZONA: without locality, 1891, *MacDougal 603* (NY); Chloride, about 1350 m. alt., 15 April 1903, *Jones* (P); Hackberry, 24 May 1884, *Jones* (F, P, US); Peach Springs, June 1884, *Lemmon* (US); Peach Springs, April 1893, *Wilson 99* (US); Kingman, 11 March 1912, *Wooton* (US); Skull Valley, about 1300 m. alt., 28 April 1903, *Jones* (P); Hillside, about 1100 m. alt., 1 May 1903, *Jones* (P); near Williams, 11 April 1905, *Wilcox* (US); Jerome Divide, 25 July 1921, *W. W. Jones* (MBG); east of Jerome Junction, 1 May 1908, *Tidestrom 898* (US); Rio Verde, Fort Whipple, 30 Aug. 1865, *Coues & Palmer 498* (MBG); Fort Verde, 1888, *Mearns* (NY); Natural Bridge, 23 April 1904, *F. M. Chamberlain 56* (US); Bradshaw Mountains, 22 June 1892, *Toumey 305a* (US); 16 km. south of Black River, White Mountains, about 1800 m. alt., 22 June 1930, *Goodman & Hitchcock 1297* (MBG, NY); Galiuro Mountains, 29 July 1894, *Toumey* (US); Tucson, 16 May 1896, *Zuck* (NY, US); washes, near Baboquivari Mountains, 24 Feb. 1923, *Hanson A1021* (F, MBG); Baboquivari Mountains, 10 March 1926, *Thackery & Leding 1100* (US); south of Warren, Sulphur Springs Valley, 3 June 1915, *Carlson* (US); Lowell, May 1884, *W. F. Parish 196, 197* (G); wash near Agua Caliente, 20 Jan. 1920, *Bartram 255* (ANSP).

CALIFORNIA: east side, summit of Providence Mountains, 29 May 1861, *Cooper* (US); vicinity of Bonanza King Mine, east slope of Providence Mountains, about 1200 m. alt., 21–24 May 1920, *Munz, Johnston & Harwood 4252* (P); Rock Spring, San Bernardino Co., May 1876, *Palmer* (G), *339* (F, MBG, NY, US); southern part of San Diego Co., 1875, *Palmer* (G).

MEXICO: LOWER CALIFORNIA: Piñone Forest, 25 July 1883, *Orcutt* (F).

In habit *V. Gooddingii* is much like *V. ciliata*, but differs in the villous-hirsute pubescence and the larger flowers. It is readily recognized in its typical form by the long-ciliate character of the bracts, the short dense villous spikes, and the shaggy pubescence.

47a. Var. **nepetifolia** Tidestrom, Proc. Biol. Soc. Wash. **38:** 15. 1925.

V. arizonica Briq. Ann. Conserv. & Jard. Bot. Genève **10:** 102. 1907, not *V. arizonica* Gray, Proc. Am. Acad. **19:** 95. 1883.

V. verna Nelson, Am. Jour. Bot. **18:** 436. 1931.

Leaves broadly ovate, coarsely and unevenly dentate, at times lobed, abruptly narrowed into a cuneate base; pubescence varying from strongly pilose to densely villous.

Distribution: Colorado, Nevada, Arizona, and northwest Mexico.

Specimens examined:

COLORADO: southern Colorado, 1867, *Parry* (US).

NEVADA: El Dorado Canyon, Lincoln Co., 1880, *T. W. Davis* (MBG); El Dorado at Nelson, 30 April 1907, *Jones* (P).

ARIZONA: Oatman, 4 May 1928, *Thackery 348* (US); Hackberry, 7 March 1912, *Wooton* (US); Camp Verde to Prescott, Aug. 1896, *Fernow* (US); by streams of Santa Catalina Mountains, 13 April 1881, *Pringle* in part (F, G, MBG); Tucson, 1871–5, *Rothrock* (US); Tucson, 1881, *Vasey* (US); Tucson Mountain, 7 March 1901, *Griffiths 2421* (NY); Tucson Mountain, 13 March–23 April 1903, *Griffiths 3489* (MBG, US); Laboratory Hill, vicinity of Tucson, April 1908, *Rose 11968* (US); Tucson, 1909, *Parish* (P); vicinity of Tucson, 1910, *Rose, Standley & Russell 15176, 15181* (NY, US); Tucson, 1911, *Beard* (MBG); Tucson Mountain, April 11, 1913, *Greenman & Greenman 56* (MBG); Tumanoc Hill, Tucson, 25 July 1916, *J. A. Harris C16375* (NY); rocky slopes west of Tucson, 26 Dec. 1919, *Bartram 257* (ANSP, US); near Tucson, 17 March 1927, *Harrison & Kearney 3646* (US); Sells, Papago Reservation, 24 Feb. 1926, *Loomis & Thackery 910* (US); Huachuca Mountains, Aug. 1882, *Lemmon* (US); south Huachuca Mountains, 31 May 1930, *Peebles 6755* (NY); Yucca, 14 May 1884, *Jones 3901* (F, P, US), TYPE collection of *V. arizonica* Briq., *36* (G).

MEXICO:

LOWER CALIFORNIA: Piñone Forest, 6 Oct. 1882, *Orcutt* (US); San Jacinto, 18 July 1885, *Orcutt 1303* (F, MBG, NY); Rosario, 3 May 1886, *Orcutt 5141* (F, MBG, NY); Agua Dulce, 48 km. southeast of San Fernando, 9 Sept. 1905, *Nelson & Goldman 7123a* (MBG, US).

SONORA: "Niggerhead Mountains, near Monument no. 82," Aug. 1893, *Mearns 1904, 1914* (US); Alamos, 26 March–18 April 1890, *Palmer 307* (G, US); Alamos, 27 Jan. 1899, *Goldman 292* (G, NY, US); Sierra de Alamos, 14 March 1910, *Rose, Standley & Russell 12840* (NY, US); Alamo, West Magdalena, 17 May 1925, *Kennedy 7033* (US); Pinocate Mountains, 21 Nov. 1907, *MacDougal 73* (US); La Cienega, 18 July 1911, *Goodding 952* (US).

SINALOA: without locality, 1922, *Ortega 4541* (US); sandy soil along river, vicinity of Fuerte, 25 March 1910, *Rose, Standley & Russell 13449* (NY, US).

The variety differs from the species in its much less indented and broader leaves. The pubescence is much more variable and at times harsh, suggesting an intergradation with *V. bipinnatifida.*

The leaf-forms recall *V. canadensis*, but the spike is scarcely distinguishable from *V. Gooddingii*.

48. V. pumila Rydb. in Small, Fl. Southeast. U. S. ed. 1, 1010. 1903, and ed. 2, 1913.

V. inconspicua Greene, Pittonia **5**: 137. 1903.

V. brevibracteata Eggert, Torreya **2**: 124. 1902, not *V. bracteosa* var. *brevibracteata* Gray, Syn. Fl. N. Am. **2**[1]: 336. 1878.

Stems usually several from a common base, branched, decumbent-ascending, hirsute, often finely glandular; leaves 1.5–3 cm. long, obtusely triangular with cuneate or truncate base contracted into a short narrowly margined petiole, trifid, occasionally lobed, divisions variously incised, appressed-hirsute on both surfaces; spikes short-peduncled to sessile, fairly compact; bracts almost as long as the calyx, linear-lanceolate, hispid-hirsute; fruiting calyx about 6 mm. long, pubescent, hispidulous along the nerves, at times finely glandular, lobes subulate, short; corolla-tube a little longer than the calyx, slightly, if at all, pubescent without; corolla-limb 3–5 mm. broad; anther-glands minute or wanting; nutlets 2.5(–3) mm. long, reticulate-scrobiculate except at base; commissural faces muriculate.

Distribution: Oklahoma, Texas, New Mexico; and Sonora and Sinaloa, Mexico.

Specimens examined:

Oklahoma: Catoosa, 8 May 1895, *Bush 1275* (MBG, NY type); Oklahoma City, 11 May 1891, *Carleton 134* (US); vicinity of Fort Sill, 6 May 1916, *Clemens 11752* (MBG); Arbuckle Mountains, Davis, 1 April 1916, *Emig 401* (MBG); Price's Falls, Murray Co., 30 April 1926, *Stratton 11* (MBG); near Crusher Spur, Murray Co., 12 April 1913, *Stevens 28* (G, MBG, NY, US); near Tishomingo, 15 April 1916, *Houghton 2570* (G).

Texas: indefinite data, *Lindheimer 501* (F, G, MBG, US); Dallas, 17 March 1876, *Reverchon 738* (MBG, US), *1963* (F, G, MBG, NY), *2117* (MBG); Polytechnic, 10 April 1913, *Ruth 110* (MBG); Tarrant Co., 10 June 1913, *Ruth 110* (G); Haskell, 1898, *Morton* (MBG); sandy ground, near Granbury, Hood Co., 6 May 1900, *Eggert* (MBG); sandy ground, Big Spring, Howard Co., 11 June 1900, *Eggert* (MBG); Round Top Mountain, Comanche Co., 9 May 1900, *Eggert* (MBG); near Comanche, 10 May 1900, *Eggert* (G, MBG); San Saba River, Brady, 16 April 1926, *Studhalter 1106* (US); San Saba, 8 May 1917, *E. J. Palmer 11843* (MBG); plains west of Pecos, 20 April 1902, *Tracy & Earle 106* (F, G, MBG, US); foothills, Davis Mountains, 23 April 1902, *Tracy & Earle 178* (F, G, MBG, NY, US); sandy ground, near Bastrop, 17 April 1929, *E. J. Palmer 33367* (MBG, NY); dry hills, Austin, May 1872, *Hall 428* (G), *431* (MBG, NY, P); Austin, *Bray 98* (NY), *Young* (G, MBG), *Young 114* (P), *E. J. Palmer 9339* (MBG), *Tharp 1362, 1364* (US), *Armer 5381* (US); gravel bars of Blanco River, Blanco, 5 April 1918, *E. J. Palmer 13281*

(MBG); Big Branch, Gillespie Co., *Jermy 184* (MBG); New Braunfels, March 1850, *Lindheimer 434* (MBG), *1075* (F, G, MBG, NY, US); Lacey's Ranch, Kerr Co., 1 June 1916, *E. J. Palmer 10003* (MBG); Kerrville, 28 March 1916, *E. J. Palmer 9278* (MBG); Hungerford, 4 March 1914, *E. J. Palmer 4840* (MBG); Wharton, 18 March 1914, *E. J. Palmer 4977* (MBG); Bexar Co., *Jermy* (MBG), *84*, *85*, (US); San Antonio, March 1882, *Havard* (US); San Antonio, *Jermy* (NY), *Jermy 209* (G), *Wilkinson 8*, *108* (MBG), *Trelease 99* (MBG), *Eggert* (MBG), *Bush 1185* (MBG), *Clemens & Clemens 976* (MBG, P); Rock Springs, 17 April 1930, *Jones 26220*, *26228* (P); gravel and sand bars, small streams, Uvalde, 11 May 1918, *E. J. Palmer 13562* (MBG); near Victoria, 11 April 1900, *Eggert* (G, MBG); Riverside, Walker Co., 24 March 1918, *E. J. Palmer 13175* (MBG); Brownsville, 23 Jan. 1919, *Hanson* (MBG); Brownsville, 30 Jan. 1919, *Hanson 322* (G, NY, US); Brownsville, 14–15 March 1923, *Tharp 1871* (US); southwest Texas, 1851–2, *Wright 1500* (ANSP, F, G, MBG, NY).

NEW MEXICO: without data, 1851–2, *Wright 1501* (ANSP); Carlsbad Cavern, 5 May 1924, *Lee 109* (US).

MEXICO:

SONORA: Alamos, 26 March–8 April 1890, *Palmer 326* (G); along an arroyo, vicinity of Alamos, 13 March 1910, *Rose, Standley & Russell 12745* in part (NY, US).

SINALOA: San Blas, 2 Feb. 1927, *Jones 23243* (MBG).

Verbena pumila has often been confused with *V. quadrangulata* and, superficially, closely resembles it, but is readily separated on the beakless nutlets.

49. V. setacea Perry,[29] n. sp. Pl. 15.

Stems decumbent-ascending, soft-pubescent; leaves 3–5 cm. long, with cuneate-truncate base narrowed into a margined petiole, trifid with segments coarsely dentate, lateral lobes small, veins somewhat prominent beneath, soft-villous-pubescent on both surfaces; spikes short-peduncled; bracts linear-lanceolate, about three-fourths as long as the calyx, subulate-setaceous, soft-pubescent, ciliate; calyx 6 mm. long, villous-pubescent, teeth (2 mm.) about half as long as the tube, subulate-setaceous; corolla-tube 7 mm. long, pubescent without; corolla-limb about 6–7 mm. broad; anthers not glandular; mature nutlet not seen.

[29] **V. setacea** Perry, spec. nov., herbacea vel basi suffruticosa; caulibus decumbentibus ramosis ramis ascendentibus piloso-pubescentibus; foliis basi cuneata in petiolum alatum attenuatis 3–5 cm. longis trifidis segmentis grosse dentatis lateralibus parvis subtus venoso-reticulatis utrinque molliter villoso-pubescentibus; spicis breviter pedunculatis; bracteis lineari-lanceolatis subulato-setaceis piloso-pubescentibus ciliatis calyce paulo brevioribus; calyce 6 mm. longo villoso-pubescente, calycis dentibus subulato-setaceis 2 mm. longis; corollae tubo 7 mm. longo extus pubescente; limbo fere 6–7 mm. lato; connectivo antherarum superiorum inappendiculato; fructu immaturo.—Collected at Calmalli, Lower California, Jan.–March 1898, *Purpus 195* (P), TYPE.

Distribution: Lower California.

Specimens examined:

MEXICO: LOWER CALIFORNIA: rocks, Calmalli, Jan.–March 1898, *Purpus 195* (P TYPE).

The gross habit of this plant is very like that of *V. Gooddingii* var. *nepetifolia*. Unfortunately the inflorescence is immature and only a few flowers are in anthesis, hence it is rather difficult to say what are the characters of the spike or of the mature nutlets. Moreover, the corolla may be larger than appears in this specimen. The flower itself is similar to that of *V. lilacina*, but the two plants are so different in habit it would seem as if this were perhaps only a superficial resemblance. The species is readily distinguished by its general habit and the long setaceous calyx-teeth.

50. V. lilacina Greene, Bull. Calif. Acad. Sci. **1**: 210. 1885.

Stems erect, much branched, 0.5–1 m. high, very sparsely hirsute or glabrous except just below the spike; leaves 3–5 cm. long, contracted at base into a margined petiole, bipinnatifid (upper pinnatifid), divisions remote, ultimate lobes chiefly linear and acute, somewhat scabrous and strigillose on both surfaces, rugose above, midrib prominent beneath; spikes fascicle-like, cymosely arranged, long-pedunculate, bracts somewhat shorter than the calyx, lanceolate-setaceous, pubescent, ciliate; calyx about 7 mm. long, appressed-pubescent, short-hirsute along the nerves, lobes unusually long (2.5–3 mm.), attenuate into subulate-setaceous teeth; corolla-tube protruding very little beyond the calyx; corolla-limb 10 mm. broad, segments emarginate; anthers not glandular; nutlets almost smooth, slightly enlarged at the base; commissural face muricate-scabrous, not reaching the tip of the nutlet.

Distribution: Known only from Cedros Island.

Specimens examined:

MEXICO:

LOWER CALIFORNIA: Cedros Island: 29 April 1885, *Greene* (G); *1889*, *Palmer* (G), *677* (F, NY); March–June 1897, *Anthony 288* (F, G, MBG, US); 12 March 1911, *Rose 16155* (NY, US).

This is an anomalous species of uncertain relationship. It has an erect open habit with more or less glabrous stem and long internodes somewhat suggesting *V. neomexicana* (§ *Verbenaca*);

nevertheless, the short stout dense spike does not point to an affinity with this section. Although the anthers are not glandular, the sterile style-lobe protrudes well beyond the stigmatic surface, and, in mature fruit, the style appears to have been inserted in a deep depression at the apex of the schizocarp; hence the species is regarded provisionally as a member of the section *Glandularia*.

51. V. amoena Paxton, Mag. Bot. **7**: 3, *pl.* 1840.

V. grandiflora Sesse & Mocino, Pl. N. Hispan. ed. 1, 6. 1887–90 [La Naturaleza, II. **1**. App.].

Stem about 5 dm. tall, decumbent or ascending, retrorsely hispidulous; leaves 5–8 cm. long, bipinnatifid, with the lower part entire, forming a broadly margined subauriculate and semiamplexicaul base, divisions remote, linear-oblong, sparsely incised, appressed-pubescent above, hispidulous beneath with midrib and veins prominent; internodes 4–6 cm. long; spike terminal, fascicle-like in anthesis, pedunculate; bracts linear-lanceolate, subulate, pubescent; calyx about 10 mm. long, densely pubescent, particularly along the nerves, glandular, teeth slender, subulate; corolla-tube slightly longer than the calyx, pubescent without, particularly around the throat; corolla-limb about 9 mm. broad; anthers unappendaged; mature fruit not seen.

Distribution: Mexico.

Specimens examined:

MEXICO:

MICHOACAN: Puruandiro, *Sesse & Mocino 99* (Herb. Bot. Gard. Madrid TYPE, MBG phot.).

MEXICO: hills, Lecheria, 5 July 1904, *Pringle 13434* (US).

This unique species is readily recognized by its coarse habit, together with its bipinnatifid, subauriculate and semiamplexicaul leaves. Although Paxton's description is not accurate, the specimen agrees well with his plate and with the photograph of *V. grandiflora*.

DOUBTFUL OR LITTLE-KNOWN SPECIES

"VERBENA ERINOIDES Lam." This species has established itself in several places. It belongs to a South American species-

complex needing critical study to determine accurately its real identity.

V. GRANDIFLORA Ortega, Hort. Matr. Dec. 2. 1797. Although the description is inadequate for positive identification, the phrase "Semina saepius duo" would seem to indicate that the species does not belong to the genus *Verbena*.

V. REPENS Spreng. Erst. Nachtr. d. Beschrieb. d. Bot. Gart. Univ. Halle, 40, no. 51. 1801. The literature on this species is very vague. The plant described is said to be a native of Santo Domingo. According to Lamarck,[30] the vervain of Santo Domingo is a species of heliotrope.

V. TRIFIDA HBK. Nov. Gen. et Sp. **2**: 273, *pl. 134*. 1818. This is a true *Verbena*, but none of the specimens at hand agrees with the description; and the floral drawings are insufficient to reveal its affinities.

V. BARBATA Grah. Edinb. New Phil. Jour. 176. 1827. This is undoubtedly a member of the section *Verbenaca*, but the description is too meagre to identify it.

V. INCARNATA Raf. Atl. Jour. 154. 1832. Here again the description is too inadequate for specific identification.

V. DELICATULA Mart. & Zucc. in Otto & Dietr. Allg. Gartenzeit. **2**: 245. 1834. Unfortunately the essential characters, which would separate this species from its allies, are not clearly defined. The description is so much like that of *V. barbata* that the writer suspects that these two species are identical.

V. MATTHESII Turcz. Bull. Soc. Nat. Mosc. **36**^{2}: 196. 1863. In the group to which this species evidently belongs, the units are very closely related; hence without more specific definition the species is obscure.

V. PAUCIFOLIA Turcz. Bull. Soc. Nat. Mosc. **36**^{2}: 196. 1863. This may be *V. carolina*, although the leaves of the latter are somewhat broader; but until such time as the type may be studied it seems preferable to withhold any decision regarding it.

V. INTEGRIFOLIA Sesse & Mocino, Pl. Nov. Hispan. 6. 1887 [La Naturaleza, II. **1**. App.]. No known Mexican species of *Verbena* has entire leaves.

[30] Lamarck, Encyc. 1, Suppl. 5: 469. 1817.

V. SCABRELLA Sesse & Mocino, *l. c.* Apparently this species does not belong to the genus, but anything further regarding its identity is unknown to the writer.

V. AUBLETIA var. LAMBERTI M. E. Jones, Contr. West. Bot. **12**: 72. 1908. This combination, nomenclatorially, belongs in synonymy under *V. canadensis*. Its entity is clearly with the section *Glandularia*, but with which species it should be associated is unknown.

LIST OF EXSICCATAE

The collectors' numbers are printed in *italics*. Unnumbered collections are indicated by a dash. The number in parenthesis is the species number used in this revision.

Abrams, L. R. — (22, 31); *2481* (22); *2574* (31); *3406* (7); *3787* (22); *9487* (31).
Abrams, L. R. & McGregor, E. A. *5* (22).
Adole, Bro. *22* (29).
Aguirre, R. T. *4* (5).
Aiton, G. B. *8467* (15).
Alden, Lieut. — (35).
Allard, H. A. *207* (31).
Anderson, I. W. — (16).
Anderson, J. P. — (15, 16).
Anderson E. S. & Woodson, R. E., Jr. *47* (17); *1577* (32).
Andrews, L. — (16).
Anect, Bro. *57* (20); *100*, *143*, *179* (41); *211* (20).
Anthony, A. W. *288* (50); *380* (4).
Antisell, T. *186* (41a).
Applegate, E. I. *2228* (22).
Armer, A. A. *5381* (48); *5385* (8).
Arsène, G. — (1, 5, 11, 46); *672* (16); *2798* (7); *3000* (11); *6129* (34); *9998* (7); *10626* (29); *11820* (32); *11831* (8); *11859* (2); *11982* (35); *12117* (32); *12242* (8); *12534* (2); *18399*, *18407*, *18543*, *18593* (31); *18615* (41); *18634* (31); *18793* (41); *18885*, *18961*, *18964* (31).
Arsène & Agniel, *10242* (7); *10252* (43).
Arsène & Benedict, *15734* (31); *16306* (41); *16600*, *16790* (31).
Arthur, J. C. *24* (17).
Ashe, W. W. — (17).
Bailey, V. *221*, *258* (43a).
Bain, S. M. *328* (19); *444* (16).
Baker, C. F. — (15, 16, 17); *288*, *564* (31); *565* (20); *920* (31); *2591* (6).
Baker, C. F., Earle, F. S. & Tracy, S. M. *531* (42).
Ball, C. R. — (31); *344* (8); *401* (40); *553* (31); *556* (15); *605* (24); *909* (40); *1171* (25); *1585* (19); *1675* (31).
Ball, J. — (31).
Ballard, C. A. — (16).
Barber, H. S. *106* (43).
Barkelew, F. E. *231* (4).
Barlow, B. — (16, 42).
Barrett, C. H. M. *13* (38).
Bartlett, A. H. *1122* (1).
Bartram, E. B. — (7); *255* (47); *256* (25); *257* (47a); *1021* (17).
Basile, Frère, *99* (7).
Bates, J. M. — (16, 19, 40).
Beard, A. — (47a).
Beattie, F. S. — (15, 16).
Beaumont — (32).
Bebb, M. S. — (31).
Beckwith, F. *48* (19); *138* (20); *772* (38).
Benke, H. C. *4566* (35); *5046* (43a); *5164* (19).
Berg, H. K. — (14).
Bergmann, L. S. — (31); *2335* (16); *2370* (31).
Berkley, E. E. *1304* (16).
Berlandier, J. *322* (8); *429*=?*1749* (40);

578 (28); *644* (25, 29a); *827* (29a); *1222* (12); *1449=189* (40); *1485* (= *225*) in part (25, 33); *1511* (8); *1520* (43a); *1592* (8); *2054* (29a); *2428=998* (40); *2506* in part (25); *3016* (8); *3018=1518* (33); *3020* (43a).
Bernoulli, G. *127* (11); *128* (5).
Bessey, C. E. — (15, 16).
Bigelow, J. M. — (14, 19, 31, 35, 42).
Billings, F. H. *49* (1).
Biltmore Herbarium, *1082b* (31); *3653a* (19); *4759*, *4759b* (17); *4761a* (32); *4762* (6).
Bissell, C. H. — (16).
Blakeley, O. W. *1462* (31); *1471* (35).
Blanchard, F. — (15, 16, 17).
Blanchard, W. H. *26*, *60*, *161* (17).
Blankinship, J. W. — (15, 17, 19, 22, 35).
Blanton, F. S. *6598* (3).
Blewitt, A. E. *14* (19).
Blumer, J. C. *1345* (40); *1612* (28); *1783* (11); *1804*, *2170* (26a).
Boettcher, F. L. J. *176*, *226* (15).
Bogusch, E. R. *1235* (24).
Bolander, H. N. *426* (31).
Botteri, M. *180* (11).
Bourgeau, E. — (16); *119* (11); *120* (43); *360* (7); *361* (28); *547* (7).
Boyce, H. T. E. — (17).
Brandegee, T. S. — (11, 16, 20, 41); *B. 466* (31).
Brannon, M. O. *128* (16).
Braunton, E. *99* (23); *378* (22); *1263* (23).
Bray, W. L. *65* (35); *98* (48); *100* (29a).
Brewer, W. H. *31* (22); *229* (22).
Brinton, J. B. — (17).
Britton, N. L. — (15); *220*, *296* (37); *1527* (14); *3176* (1).
Britton, N. L. & Brown, M. S. *28* (6); *98* (2); *153* (1); *373*, *1631* (14).
Britton, N. L. & Cowell, *10326* (6).
Britton, N. L. & Hollick, *2704* (14).
Britton, N. L. & Wilson, P. *5771* (14).
Britton, N. L., Britton, E. G. & Brown, M. S. *6019*, *7037* (14).
Britton, N. L., Britton, E. G. & Shafer, J. A. *292* (14).
Britton, N. L., Brown, M. S. & Wortley, *1645* (1).
Britton, N. L., Wilson, P. & Leon, Bro. *15256* (14).
Broadhead, G. C. — (15, 35).
Brown, H. E. *58* (31).
Brown, S. *492* (6); *693* (1).
Brown & Britton—see Britton & Brown.
Bryant, M. L. *88* (22).
Bucholz, A. F. — (15).
Buckley, S. B. — (8, 31, 32).
Burgess, A. B. *638*, *713*, *783* (37).
Burk, M. *542a* (31); *591* (15).
Burnham, S. H. — (15, 17).
Bush, B. F. — (15, 17, 35); *28*, *77*, *84* (8); *205* (40); *206* (17); *283* (35); *312* (32); *318* (35); *351* (40); *432* (15); *433* (17); *435* (19); *436* (31); *437* (35); *449* (40); *450* (17); *452* (15); *475* (19); *545* (35); *569* (35); *570* (19); *601* (31); *884* (15); *899* (24); *914* (17); *1034* (31); *1168* (35); *1185* (48); *1275* (coll. of 1900) (24); *1275* (coll. of 1895) (48); *1482* (15); *1933* (35); *2109* (31); *2214* (16); *2901* (35); *4010* (31); *4029* (40); *4922*, *6439* (35); *7586a*, *7647* (17); *8537* (31); *9165* (16).
Butler, G. D. *1621* (22).
Calderon, S. *729* (5); *794* (11); *925* (5).
Campbell, J. E. — (16).
Campbell, J. R. *67* (15).
Canby, W. M. — (32); *193* (33); *194* (29a).
Carleton, M. A. —, *177* (40).
Carleton, M. L. *134* (48).
Carlson, J. I. — (7, 23, 26a, 41a, 47).
Carr, W. P. *118* (19); *179* (31).
Carter, W. R. — (16).
Chamberlain, E. B. *418* (31).
Chamberlain, E. B. & Knowlton, F. H. — (16).
Chamberlain, F. M. *56* (47).
Chandler, H. P. — (8, 16).
Chandonnet, Z. L. — (15, 16, 19, 31).
Chapline, W. R. *609* (26).
Chapman, A. W. — (6, 14, 15, 16, 31, 32).
Chase, A. — (15).
Cheney, C. I. — (16).

Chestnut, V. K. — (22).
Choussy, F. *36* (11).
Churchill, J. R. — (31).
Clark, J. A. *55* (31); *253* (16); *279* (31).
Clark, O. M. *4041* (29a); *4250* (27).
Clawson, A. B. *13923* (42).
Clemens, Mrs. J. — (22, 31); *11748* (19); *11749* (15); *11750a* (31); *11751* (40); *11752* (48).
Clemens, Mr. & Mrs. J. *969*, *970* (8); *971*, *972*, *973*, *974* (29a); *976* (48).
Clements, F. *2612* (31); *2776* (40).
Clements, F. E. & E. S. *9* (31).
Clifton, R. L. *3085* (40).
Clute, W. N. *93* (31).
Clokey, I. W. — (36); *1865* (11).
Collins, F. S. *45* (1); *53*, *266* (2); *267* (6); *268* (14); *269* (1).
Collins, J. F. — (15, 16).
Combs, R. *389* (14).
Congdon, J. W. — (23).
Conzatti, C. *4194* (29); *4207* (7); *4288* (29).
Cook, O. F. & Griggs, *148* (5).
Cooper, J. G. — (47).
Cooper, J. J. *5890* (5).
Cory, V. L. *664* (44).
Cotton, J. S. *621*, *1363* (31); *1396* (16).
Coues, E. & Palmer, Ed. *279* (16); *498* (47); *571* (26a).
Coulter, — (43).
Coville, F. V. & Funston, F. *953* (31).
Cowen, J. H. — (41).
Crandall, C. S. *2014* (16).
Crawford, D. L. — (22, 31).
Crawford, M. A. — (36a).
Croft, M. B. *78* (33).
Culbertson, J. W. *4210* (22).
Curtis, C. D. — (15).
Curtis, M. A. — (6).
Curtiss, A. H. — (6, 17, 32); *677* (6); *1955* (17); *1959* (32); *1963* in part (2, 37, 38); *4386*, *4765* (32); *5111* (14); *5706* (37); *6490* (3).
Cusick, W. C. *1967* (31).
Cuthbert, A. *267* (2); *268* (32); *358* (2).
Davidson, A. — (14).
Davis, J. *16* (19); *73*, *950* (15); *1202* (19); *1274a* (15); *1513* (19); *2414*, *2691* (31); *2791*, *2960*, *2962* (19); *3192* (16); *3227* (19); *3453* (15); *3565*, *3578* (16); *3587* (31); *3588* (17); *3589* (19); *3590* (16); *3591* (15); *3817* (16); *3852*, *4450* (15); *4552* (17); *4461*, *4487* (19); *4565* (15); *6370* (19); *8458* (15); *9039* (31); *9117* (15).
Davis, T. W. — (47a).
Day, M. A. *79*, *147* (15); *149* (16).
Deam, C. C. — (19); *86* (43); *1272* (31); *6180* (5); *13619*, *20357* (17); *20357a* (19).
Deam, Mrs. C. C. *1799* (32); *1831* (35).
Dean & Thomas, *4874* (16).
Deane, W. — (15).
Dehesa, M. P. *1551* (11).
Demaree, D. *3353*, *3371* (31); *3553* (19); *6411* (35); *7539* (25); *7685* (43a).
Dewart, F. W. *15*, *18* (15); *42* (17); *74* (35).
Deweys, Mrs. F. E. — (8).
Dewhurst, B. L. — (31).
Dixon, R. A. *473* (24); *561* (40).
Dodge, C. K. *154* (33).
Donnelly, L. L. — (40a).
Drummond, T. — (14, 24, 35); *253 bis* (24).
Drushel, J. A. — (32); *2762* (35); *2842* (24); *3659* (35); *4887* (31); *6351* (16).
Duges, A. — (7, 11); *496*, *496a* (43).
Dunkle, M. B. *1955* (23).
Duss, Père, *3470*, *4697* (1).
Dutton, D. L. — (16).
Eames, A. J. *12797* (19).
Eames, E. H. — (19); *8137* (31).
Eames, E. H. & McDaniels, L. H. *4870* (15).
Earle, F. S. *84* (40); *387* (27); *427*, *606*, (25); *619* (27); *638* (41).
Earle, F. S. & Baker, C. F. — (31, 32).
Earle, F. S. & E. S. *236* (41); *351* (31); *387* (27); *526* (40).
Earle, F. S. & Underwood, — (32).
Eastwood, A. — (23, 41); *25* (31); *41* (16); *90* (19); *6500* (23); *8468* (42).
Eaton, D. C. — (15, 16, 17).
Edwards, — (20).
Eggers, H. F. A. von, *1828* (6).
Eggert, H. — (6, 8, 15, 16, 17, 19, 24,

25, 29a, 31, 32, 33, 35, 40, 41, 42, 43a, 44, 48).
Eggleston, W. W. — (17); *1531* (15); *4430* (17); *4837* (19); *4841* (15); *5237* (17); *6644* (41); *12240* (35); *15224* (19); *15551* (16); *17106* (20); *17231* (42).
Ehlers, J. H. *627* (31); *642* (19).
Ehrenberg, C. *131* (46); *713* (10).
Ellis, C. C. *17* (42); *221* (31); *258* (20).
Elmer, A. D. E. —, *324* (31); *537* (16); *3846*, *4045* (22); *4950* (23).
Emig, W. H. *107*, *365* (19); *395* (40); *401* (48); *415* (35); *716* (15); *787* (19); *788* (40).
Engelmann, G. — (16, 17, 19, 23, 31, 35, 41); *334* (35); *336* (17); *337* (16).
Engelmann, H. — (19).
Epling, C. C. *5445* (22); *6134* (35).
Ervendberg, L. C. *153* (10); *236* (34).
Evans, W. H. — (43b).
Evermann, B. W. *970* (19).
Eyerdam, W. J. *201*, *432* (14).
Ezell, A. *5699* (8).
Fassett, N. C. & Hotchkiss, N. *3322* (16).
Fawcett, H. S. *12* (31).
Faxon, C. E. — (16).
Fendler, A. — (31); *586* (41); *587* (31); *594* (25); *597* in part (19, 20).
Fernald, M. L. — (16, 31); *296* (16).
Fernald, M. L., Hunnewell, F. W. & Long, B. *10262* (15).
Fernald, M. L. & Long, B. *10263* (16).
Fernald, M. L. & Parlin, J. E. *928* (15).
Fernald, M. L. & Pease, A. S. *25247* (16).
Fernow, B. E. — (47a).
Ferris, R. S. & Duncan, C. D. *2474* (41); *2607* (26b); *2647* (42); *2726* (25); *3161* (34); *3268* (24); *3337* (8); *3513* (16).
Fink, B. — (31); *251* (19).
Fisher, G. L. — (11, 16, 35, 41, 46); *19* (19); *33*, *40*, *47* (35); *122* (24); *168* (5); *207* (43); *212* (24); *223* (43); *235* (29a); *282* (25); *319* (43); *320* (12); *337* (46); *460*, *625* (1); *707* (35).
Flint, M. B. — (35).
Flynn, N. F. *69* (6).
Forrer, A. — (30, 40a).
Forwood, W. H. *298* (31); *299* (19).
Fowler, J. — (16).
Fredholm, A. *110*, *5136* (32); *5416* (14); *5804* (38).
Freiburg, G. W. — (15, 19).
Fritchey, J. A. *29* (22).
Frost, W. D. — (19).
Fuertes, M. *391*, *1758* (14); *1771*, *1856* (6).
Furness, D. R. — (43).
Galeotti, H. *735* (11); *736* (43); *737* (11); *777* (46); *778* (7); *781* (5); *795A* (11).
Gallegos, J. M. *2342* (18).
Gandoger, M. — (36).
Garber, A. P. — (38).
Garcia, P. I. *331* (40a).
Gardner, J. R. *583* (19).
Garesche, E. E. — (19).
Gates, F. C. *9994* (19).
Gates, F. C. & M. T. *10708* (16).
Gattinger, A. — (19).
Gershoy, A. *583* (6).
Geyer, C. A. — (16, 40).
Gibbes, L. R. — (2, 15).
Gilman, M. F. *1120* (26a).
Glatfelter, N. M. — (8, 15, 17).
Gleason, H. A. — (19, 31); *377* (19); *718* (15); *1945* (16).
Goldman, E. A. *42* (34); *292* (47a).
Goldsmith, G. *119* (15).
Goodding, L. N. *37* (40a); *207* (31); *251* (40); *334* (26a); *495* (40); *645* (47); *883* (40a); *952* (47a); *1022*, *2312* (31).
Goodman, G. J. & Hitchcock, C. L. *1211* (40); *1297* (47); *1317* (31).
Gotfredson, Mrs. A. *90* (16).
Graham — (11).
Grant, M. L. *3073* (16).
Graves, E. W. *525* (1); *536* (40); *621* (32); *1691* (15); *1946* (40); *1947*, *1994* (19).
Green, T. — (17).
Greene, E. L. — (23, 26, 42, 43b, 50); *45* (41); *77* (20); *860* (22).
Greenman, J. M. — (35); *244*, *245* (15); *398*, *1273* (16); *1376* (15); *1377*, *1379* (16); *1380* (15); *1382* (16); *1877* (15); *1953* (16); *1981*, *3640* (17); *3766* (15); *3870*, *4076* (35); *4125* (17); *4231* (35); *4412* (15); *4578* (17).

Greenman, J. M. & Greenman, M. T. *28* (25); *56* (47a).
Gregg, J. — (8, 29, 43); *11* (7); *26*, *57* (43); *99* (29); *202* (34); *246* (29); *257* (43); *265*, *276* (7); *355* (36a); *406* (7); *433* (31); *545* (29); *623* (31); *632* (43); *636* (31); *648* (43); *740* (29); *752* (34); *756* (43); *764* (5); *791* (29a); *823* (7); *1001* (11).
Griffith, F. *3456* (40).
Griffiths, D. *1595* (25); *1919* (41a); *2421* (47a); *3431* (26a); *3489* (47a); *4244* (41); *4757* (43) *4833* (40a); *5050* (19); *5190* (42); *5560* (31).
Griffiths & Hunter, *18* (31).
Griffiths, D. & Thornber, J. J. *159* (40a).
Grimes, E. M. *3716*, *3738* (17); *3794* (15).
Groth, B. H. A. *16* (29a); *30* (40); *75* (8); *187* (24).
Guidroz, H. *3* (15).
Gurney, J. & Monell, J. T. — (40).
Hale, T. J. — (8, 15, 17, 19, 24, 35); *245* (8).
Hall, E. — (19, 31); *393* (31); *428* (48); *429* (25); *430* (29a); *431* (48); *432* (8); *433* (1); *434* (24); *435* (35).
Halsted, G. *175* (15).
Hammond, E. W. *322* (22).
Hansen, G. *964*, *1823* (22); *2025* (5).
Hanson, H. C. — (48); *A146* (43b); *A147* (31); *A148* (20); *322* (48); *551* (42); *619* (25); *645* (26b).
Hanson, H. C. & E. E. *A1021* (47); *A1130* (26a).
Harger, E. B. — (16, 17).
Harper, R. M. *15* (40); *242* (14); *385* (17).
Harris, J. A. *C16375* (47a).
Harris, W. *9132* (2); *9937*, *11808* (14); *11969* (1).
Harrison, G. J. *4778* (26a); *4897* (14).
Harrison, G. J. & Kearney, T. H. *3646* (47a); *5796* (26a); *6144* (11); *6689* (26a).
Harshberger, J. W. — (1, 2); *41* (46).
Hartman, C. V. *94* (11); *608* (26a); *880*, *906* (40a).
Hartweg, T. *174* (28); *175* (7); *176* (43); *177* (29); *1924* (22).
Harvey, F. L. *61* (19); *62* (31); *1958* (19).
Harwood, R. D. — (42).
Havard, V. — (25, 27, 31, 33, 42, 44, 48); *97* (42); *197* (27).
Hayden, F. V. — (15, 16, 40); *10* (31).
Haynes, D. — (22).
Hedgcock, G. G. — (15, 16).
Heller, A. A. — (15, 31); *638* (19); *1388* (33); *1419* (8); *1732* (29a); *5785*, *5919*, *6778* (22); *14222* (16); *14290* (19); *14303* (31).
Heller, A. A. & E. G. *3536* (42).
Henderson, L. F. *4070* (31).
Herrick, C. L. *704* (42); *715* (26b).
Hertel, H. — (15).
Hexamer, A. C. & Maier, F. W. — (16, 17, 35).
Heyde, E. T. *120*, *477*, *530* (11); *610* (5).
Heyde, E. T. & Lux, E. *3018* (11); *3019* in part (5, 11); *4370* (5).
Hicks — (15).
High, M. M. *52* (8); *59* (43a); *75* (33).
Hilgard, E. — (8, 32).
Hillman, F. H. — (31).
Hitchcock, A. S. — (2, 14, 15, 16, 17, 32, 35); *269* (14); *393* (40); *790* (35); *791* (17); *972* (19); *1129* (31).
Hoffstetter, G. — (15).
Holgate, W. R. — (31).
Holm, T. — (15).
Holzinger, I. M. — (19, 26, 41a).
Hooker, L. H. *5999* (34).
Hough, W. *109* (43).
Houghton, H. W. *2570* (48); *3622* (17); *3643* (35); *3646* (17); *4000* (19); *4015* (15).
House, H. D. *875*, *1363* (17); *3276* (32).
Howell, A. H. *64* (19); *111*, *308* (40); *313*, *362* (8).
Howell, T. *174* (22); *292* (16); *1249* (22).
Hoyeradt, L. H. — (17).
Humboldt, A. & Bonpland, A. — (11); *4063* (36); *4066* (12).
Hyams, M. E. — (32).
Jaeger, E. C. — (47).
Jermy, G. — (48); *84*, *85* (48); *182* (29a); *183* (40); *184* (48); *203* (8); *209* (48).

Jesup, H. G. — (16).
Johnson, A. G. — (15, 16, 19, 35).
Johnston, E. L. *507* (16); *986* (41).
Johnston, I. M. — (14); *1320*, *1608* (22).
Jones, M. E. — (7, 8, 11, 16, 19, 20, 22, 23, 25, 26a, 40, 40a, 42, 43b, 47, 47a); *36* (47a); *122* (41); *372* (25); *457* (42); *487*, *523* (16); *554* (29); *634* (41); *686* (43); *1487* (16); *2598* (22); *3801* (43b); *3901* (47a); *5478* (31); *6026* (20); *8963* (16); *23243* (48); *23244* (43); *25006* (11); *25480* (43b); *26220* (48); *26221* (25); *26222*, *26223* (29a); *26224* in part (26b); *26225*, *26226* (29a); *26227* (43b); *26228* in part (40, 48); *26229* in part (8, 40); *26231* (43); *26232* (43b).
Jones, W. W. — (47); *180* (43b); *185* (41a); *344*, *346* (26a).
Joor, J. F. — (8, 14, 15, 32).
Kammerer, A. L. *33* (42).
Katzenstein, O. — (32).
Keeler, H. D. — (14).
Kellerman, W. A. — (17); *5825* (11).
Kellogg, J. H. — (15, 16, 35); *496* (17); *498* (19); *1130* (17); *1131* (16); *1958* (35); *15276* (31); *15277* (15).
Kellogg, W. — (38).
Kelsey, J. A. *173* (16).
Kempton & Collins — (11).
Kendall, M. L. — (22).
Kennedy, G. G. — (15).
Kennedy, P. B. *7032* (31); *7033* (47a).
Kerber, E. *255* (43); *311* (5).
Killiam, O. L. *6933* (15).
Killip, E. P. *3510* (5).
King, H. — (17).
Kirn, A. J. *2139* (14).
Knause, O. — (15).
Knowlton, C. H. — (16).
Korthoff, I. — (3).
Kreager, F. O. *469* (16); *474* (31); *475* (19).
Krig, J. T. *3187* (14).
Kuntze, O. *424* (43); *2109* (5); *23444* (28); *23738* (46); *23811* (24).
Lane, W. C. — (15, 16).
Lang, H. A. *102* (14).
Langlois, A. B. — (1, 24, 40); *123* (24).
Lansing, O. E. — (16); *2805* (16); *2806* (15); *2810* (19); *2976*, *3135* (17); *3164* (19); *3241*, *3340* (16).
Laybourne, W. A. — (15).
Lea, M. C. — (6).
Lee, D. W. *109* (48).
Lehmann, F. C. *1603* (46).
Leiberg, J. B. *902* (31); *2630* (16).
Lemmon, J. G. — (28, 47, 47a); *2857* (26a); *3075* (11).
Leon, Frère — (6); *685* (14); *3910* (1).
Leon, Frère & Edmunds, Frère — (6); *8719* (14).
Leonard, E. C. *3939* (6).
Leonard, E. C. & Killip, E. P. *534* (17).
Leroy & Ruger — (31).
Letterman, G. W. — (8, 15, 17, 19, 24, 35, 40).
Lewton, F. L. *141* (34).
Liebmann, F. M. *11308* (46); *11313*, *11314* (34); *11316* (46); *11318* (13); *11328*, *11329*, *11330* (46); *11335* (10).
Lighthipe, L. H. *599* (35).
Lindheimer, F. — (8, 14, 16, 24, 35); *145* (24); *146* (40); *154* (24); *155* (8); *195* (15); *232*, *289* (40); *294* (29a); *307* (40); *434* (48); *500* (29a); *501* (48); *618* (14); *1072*, *1073* (40); *1074* (29a); *1075* (48); *1076* (8); *1077* (14).
Lloyd, C. E. *448* (11).
Lloyd, F. E. *159* (43).
Lloyd, F. E. & Tracy, S. M. — (6); *20* (3); *22* (14).
Loomis, H. F. & Thackery, F. A. *910* (47a).
Louis-Marie, Père, *141* (16).
Lumholtz, C. *445*, *446* (36a).
Lunell, J. — (16, 31).
Lyall, D. — (31).
Lyon, *6* (14).
Lyonnet, E. — (7); *173* (36).
Macbride, J. F. *200* (31); *304* (16).
Macbride, J. F. & Payson, E. B. *781* (7); *850* (23).
MacDaniels, L. H. *4873* (16).
MacDougal, D. T. *73* (47a); *153* (7); *249* (20); *286* (31); *317* (40); *566* (16); *603* (47).
MacElwee, A. *760* (17); *873* (6); *882* (15).

Mackenzie, K. K. *96* (8); *261* (19); *4213* (17); *4746* (15).
MacMillan, C. — (19).
Macoun, J. — (16, 31); *1305* (17); *24268* (31).
McAtee, W. L. *1953* (8); *2053* (19).
McClatchie, A. J. — (14).
McFarland, F. T. *92* (15); *109* (17).
McFarland, F. T. & Anderson, W. *253* (19).
McKelvey, S. D. *1710* (29a); *1756* (25); *2046* (26b).
Manning, W. H. — (19, 31).
Marble, D. W. *737* (2).
Marsh, C. D. *14224* (42).
Mathias, M. E. *545* (41).
Mattern, E. S. & W. I. — (38).
Maxon, W. R. *3808* (40).
Maxon, W. R. & Harvey, F. L. *7951* (5).
Maxon, W. R., Harvey, F. L. & Valentine, *7356*, *7478* (5).
Maxon, W. R. & Killip, E. P. *569* (2).
Mearns, E. A. — (40a, 47); *108* (43); *524* (31); *1013* (26a); *1116* (28); *1138* (41a); *1237* (29a); *1252*, *1274*, *1394* (40); *1456* (29a); *1887* (26a); *1904*, *1914* (47a); *1918* (26a); *2278*, *2486* (41a); *2627* (11); *2677* (41); *2698*, *5009* (31).
Mell, C. D. — (38).
Mell, C. D. & Knopf, E. C. — (31).
Mellichamp, K. — (32).
Meredith, H. B. — (6).
Merrill, E. D. & Wilcox, E. N. *776* (31).
Merton, E. C. *2042* (26a).
Metcalfe, O. B. *126* (42); *137* (31); *612* (26); *897* (31); *955* (26); *1008* (31); *1090* (42); *1231* (41); *1568* (27).
Michener, C. A. & Bioletti, F. T. *123* (23).
Millspaugh, C. F. *865* (17).
Mohr, C. — (1, 3, 5, 7, 11, 17, 24, 31, 32).
Molby, E. *7224* (34).
Moldenke, H. N. *148* (2); *212* (38); *219a*, *549*, *586* (37); *591*, *599a*, *972* (14); *1039* (38); *1091* (32); *1184* (3); *1330* (15); *1339* (16).
Moore, A. H. *2569* (16); *2874* (14); *2939a* (6); *2946* (2); *2947* (14); *2984* (1); *4316* (16).
Moore, J. A. & Steyermark, J. A. *3001* (40); *3005* (29a); *3009* (41); *3277* (26b); *3299* (25); *3324* (42); *3611* (27); *3622* (41).
Morales, R. *786* (11).
Morong, T. — (16, 31).
Morris, E. L. — (15, 16).
Morton, Mrs. K. F. — (48).
Moseley, E. L. — (17, 31).
Muehlenberg, G. H. E. — (17).
Mueller, F. — (11); *325* (43); *766*, *887* (11); *1209* (43); *1215* (29); *1319* (43).
Mulford, A. I. — (31); *37* (42); *39* (20).
Munz, P. A. *616* (15); *617* (16); *1149* (26a); *1231* (41a); *1249* (43); *1470*, *1607* (24); *2207*, *6349*, *6598* (31); *6734*, *9295* (22).
Munz, P. A. & Johnston, I. M. *11289* (14).
Munz, P. A., Johnston, I. M. & Harwood, R. D. *4252* (47).
Murdoch, J. — (40a).
Nash, G. V. *601* (32); *1248* (14); *2470* (38).
Nealley, G. C. — (33); *117*, *118* (34).
Nelson, A. *320* (31); *505*, *538* (19); *1652* (31); *2258* (16); *7671* (31); *8245* (40); *8354* (20); *8489* (16).
Nelson, E. W. *196*, *223*, *242* (46); *1021* (11); *1105* (12); *1513*, *1895* (45); *1943* (7); *3896* (36a); *3920* (43); *4424* (34); *4559* (43); *4577* (7); *4593* (28); *4604* (43); *4856* (40a); *6117* (40); *6161*, *6271* (26a); *6628* (34); *6789* (41); *6858* (43).
Nelson, E. W. & Goldman, E. A. *7123a* (47a); *7425* (21).
Nelson, J. C. *1429* (22); *1804* (16); *2669* (22).
Ness, H. — (24).
Nicholas, — (11).
Nichols, G. E. *163* (2).
Nicolas, — (29).
Nicollet's Northwest Expedition, — (40).
Nieuwland, J. A. *2685* (17).
Norton, J. B. — (6, 15, 17); *389* (15); *390* (16); *391* (19); *392* (31).

Nuttall, T. — (17, 40).
Oakes, W. — (6).
Oersted, A. S. *11322*, *11324* (5).
Olney, S. T. — (16).
O'Neill, H. — (14); *986* (32); *6309* (37).
Orcutt, C. R. — (18, 31, 33, 47a); *909* (18); *1228* (31); *1301* (23); *1302* (14); *1303* (47a); *1546*, *1549* (31); *2736* (2); *3321* (13); *3488* (11); *3551* (46); *3950* (12); *4045* (11); *4146* (46a); *5141* (47a); *5423* (10); *5542* (33); *5555* (25); *5657* (43a); *5717* (25); *5730* (33); *5792* (43a); *5867* (8); *6096* (41); *6111* (29a); *6172* (43b); *6184* (44); *6197* (41); *6235* (25).
Ortega, J. G. *4215* (7); *4541* (47a).
Osterhout, G. E. — (15, 16, 20, 41); *3165* (40).
Over, W. H. *2103* (40); *3177* (40); *14386* (19).
Overholts, L. O. — (15, 17).
Pace, L. *22* (8).
Pagel, L. E. *2208* (33).
Palmer, Edward — (17, 26a, 41, 47, 50); *25* (29); *35* (43); *39* (34); *47* (40); *51* (36a); *52* (26a); *74* (43); *78* (8); *79* (43); *82* (29a); *90* (34); *135* (28); *141* in part (5); *141* in part, *153*, *191* (coll. of 1898) (7); *191* (coll. of 1906) (36a); *200* (28); *268* (7); *281* (43); *295* (36a); *303* (29); *307* (47a); *308* (7); *309* (22); *310* (23); *312* (26a); *326* (48); *339* (coll. of 1876) (47); *339* (coll. of 1896) (11); *339½* (26a); *341½* (23); *342* (22); *345* (43); *356* (7); *364* (11); *397* (14); *401* (43); *456* (28); *677* (50); *911* (28); *1040* (14); *1042* (7); *1043* (8); *1044* (29a); *1046* (33); *1047* (29); *1048* (31); *1050* (41); *1051* (34); *1052* (36a); *1156* (11); *2014a*, *2019* (5); *2037* (10); *2038* (25); *2039* (33); *2040* (25); *2055* (43); *2057* (11); *2529a* (22); *2699* (31); *6433* (38).
Palmer, E. J. *197* (16); *198* (15, 16); *199* (19); *200* (17); *304* (35); *454* (31); *559* (35); *1085* (16); *1747* (33); *2980* (19); *2981* (17); *2996* (35); *3319* (17); *4229* (15); *4232* (17); *4840*, *4977* (48); *5044* (8); *5185*, *5407*, *5682* (35); *5769* (17); *6106* (31); *6107* (19); *6510* (40); *7001*, *7071*, *7124* (35); *7369* (8); *7556* (24); *7821* (40); *8000* (15); *8045*, *9098* (40); *9111* (8); *9183* (29a); *9278*, *9339* (48); *9485* (8); *9559* (32); *10002* (29a); *10003* (48); *10037* (8); *10568* (16); *10692* (14); *11715* (8); *11843* (48); *11979* (35); *12001*, *12038* (1); *12056* (35); *12496a* (31); *13175*, *13281* (48); *13282* (25); *13283* (29a); *13512* (39); *13562* (48); *13563* (29a); *13564* (8); *13730* (25); *13861* (31); *14283* (35); *15262* (17); *24616* (35); *27209* (40); *27462* (14); *28738* (16); *29303* (2); *29333* (35); *29535* (29a); *29804* (35); *30523* (25); *30672* (42); *30791* (26b); *31117* (31); *31153* (41a); *31192* (41); *33319* (35); *33367* (48); *33389* (40); *33537* (25); *33583* (42); *33592* (33); *33604* (8); *33605*, *33646* (29a); *34065* (26b); *34240* (41); *34766* (17); *35235* (32); *37627* (19).
Palmer, W. — (16).
Pammel, L. H. — (17, 19); *78* (16); *85* (19); *187* (22); *272*, *1699* (17); *1806* (16).
Pammel, L. H. & Blackwood, R. E. *3589* (31); *3638* (16).
Parish, S. B. — (14, 47a); *2819* (22); *5338*, *7149* (14); *10288* (31); *11590* (22).
Parish, W. F. *196*, *197* (47).
Parish, S. B. & W. F. *969* (22); *1043* (14); *2171* (31); *11143* (14).
Parker, C. F. — (6, 17, 31).
Parlin, J. E. — (16).
Parry, C. C. — (47a); *157* (40).
Parry, C. C., Bigelow, J. M., Wright, C. & Schott, A. — (26b, 31, 40, 44).
Parry, C. C., & Lemmon, J. G. *342* (22).
Parry, C. C. & Palmer, E. *717* (7); *718*, *719* in part (46a); *719* in part (43); *720* (36a); *722* (28).
Patterson, H. N. — (19).
Patzky, — (28).
Pease, A. S. & Long, B. *22350* (16).
Peck, M. E. *8702* (22).
Peebles, R. H. *5353* (43); *6755* (47a).

Peebles, R. H., Harrison, G. J. & Kearney, T. H. *3790* (26a); *4243* (31); *4549* (40).
Peirson, F. W. *3379* (7).
Penard, E. *348* (41).
Pennell, F. W. *4204*, *4332* (1); *5444* (40).
Perkins, J. R. *1024* (1); *102* (2).
Peterson, N. F. — (35).
Phelps, O. P. *799* (16); *800* (15).
Pilsbry, H. A. — (42).
Piper, C. V. *6160* (22).
Pitcher, — (35).
Pittier, H. *414* (29); *1909* (11).
Plank, E. N. — (19).
Plaskett, R. A. *142* (22).
Plummer, F. G. — (42).
Pollard, C. L. — (38); *1191* (14); *1312* (17).
Pollock, W. M. — (16).
Porter, T. C. — (6).
Price, S. F. — (15, 17).
Price, W. W. — (26a).
Pringle, C. G. — (11, 14, 25, 26a, 28, 40, 47a); *54* (28); *270* (26a); *1117* (43); *1599* (7); *1948* (10); *2228* (34); *2813* (11); *2927* (46); *3467* (41); *3551* (46a); *4180* (46); *4769* (12); *4784* (29); *4877* (5); *4892* (11); *5715* (7); *6539* (28); *6908* (36); *7590* (28); *7591* (43); *8534* (7); *9135* (28); *9312* (11); *9313* (43); *9529* in part (7, 11); *11091* (43); *11092* (36); *11093* (5); *11843* (34); *13157* (41); *13158* (43); *13159* (28); *13434* (51); *13597* (12); *13792* (46).
Purpus, C. A. *137* (46a); *195* (49); *467* (29); *1094* (26b); *1095* (43); *1433* (36); *3406* (13); *3407* (43); *4524* in part (31, 43); *4974* (36a); *5451* (10); *5515* (29); *6061* (47); *6413* (1).
Quaintance, A. L. — (14).
Rafinesque, C. S. — (31).
Randolph, L. F. & F. R. — (32); *52* (37); *474* (15); *587*, *645* (6); *688* (1); *1004* (3); *1012* (14).
Ravenel, H. W. — (15, 31, 32).
Read, A. D. — (14); *19* (20).
Reade, J. M. — (1).
Redfield, J. H. — (15, 16); *522* (19); *6430* (17).
Redfield, R. *4* (11).
Rehn, J. A. & Viereck, H. L. — (42).
Renson, C. *175* (11); *291* (5).
Reverchon, J. — (15, 19, 35, 40); *42* (8); *118* (25); *732* (8); *734* (15); *735* (19); *736* (31); *737* in part (25, 29a); *738* (48); *739* (40); *740* (35); *834* in part, *1953* (25); *1961* (29a); *1962* (40); *1963* (48); *2116* (31); *2117* (48); *2118*, *2532* (24); *2533* (35); *3902* (33); *3903* (29a); *3904*, *4314* (25).
Reynolds, M. C. — (32).
Rich, W. P. — (31).
Riddell, J. L. *1268* (8).
Ridgway, R. *2431* (19); *2831* (15).
Riehl, N. — (16); *9* (31); *135* (15); *196* (19); *456* (17).
Robinson, B. L. — (19); *26* (32); *94* (2); *113* (6); *127* (2); *134* (15); *153*, *196* (16); *559* (15); *572* (16).
Rojos, *44* (11).
Rolfs, P. H. — (31); *191* (32).
Rose, J. N. *1677* (11); *1763* (7); *2435*, *2769* (43); *11968* (47a); *16155* (50).
Rose, J. N. & Fitch, W. R. *17105* (40); *17106*, *17503* (31); *17504*, *17801* (41).
Rose, J. N., Fitch, W. R. & Parkhurst, *17717* (20).
Rose, J. N. & Hay, R. *5310* (12); *5488* (28); *5556* (36); *6049* (46); *6212* (29).
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Rose, J. N. & Painter, J. H. *6431* (43); *7741* (29); *7742* (43); *7799* (7).
Rose, J. N., Painter, J. H. & Rose, J. S. *8382* (7); *8495* (28); *8496* (11); *8668* (36); *8753* (7); *8823* (46a); *8971* (29); *9077*, *9151* (5); *9162* (29); *9503* (43).
Rose, J. N. & Rose, J. S. *11398* (43).
Rose, J. N., Standley, P. C. & Russell, P. G. *12451*, *12934* (7); *12745* in part (48); *12840* (47a); *13130*, *13422*, *13447* (7); *13449*, *15176*, *15181* (47a).
Rothrock, J. F. — (47a).
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von Rozynski, H. W. *13*, *17*, *135* (29a).
Ruano, J. M. *332*, *403* (5).
Rugel, F. — (15, 31, 32, 35); *121* (6); *127* (17); *156* (14); *305* (38).
Ruger, M. — (17, 31).

Runyon, R. *628* (33); *629* (29a); *630* (43a); *1260* (15).
Rusby, H. H. — (20, 42); *124* (46); *181* (7); *336* (31).
Ruth, A. — (6); *107* (40); *108* (8); *109* (31); *110* (48); *495*, *518* (31); *731*, *740*, *765* (17); *788*, *833* (15); *1289* (25).
Rydberg, P. A. — (16); *154* (17); *932* (19); *934* (31); *935* (40); *1422* (19); *1515* (16); *1716* (15).
Rydberg, P. A. & Carlton, E. C. *7043* (31).
Rydberg, P. A. & Garrett, A. O. *9201* (28).
Rydberg, P. A. & Imler, R. H. *22* (35); *120* (17); *379* (35); *433* (19); *482* (15); *1008* (31); *1212*, *1253* (40).
Rydberg, P. A. & Vreeland, F. R. — *5676* (41).
St. John, Mrs. O. — (20).
Safford, W. E. *216* (17); *1221* (34); *1398* (43).
Safford, W. E. & Mosier, *210* (37).
Salas, G. *32* (5).
Salazar, F. — (5, 7, 10, 12, 28).
Sandberg, J. H. & Leiberg, J. B. *340* (31).
Sandberg, J. H., MacDougal, D. T. & Heller, A. A. *264*, *972* (31).
Sanford, S. N. — (19).
Sarvis, J. T. *122* (31).
Savage, T. E., Cameron, F. E. & Lenocker, J. E. — (16).
Schaffner, J. G. *716* (36a); *717* (43); *718* (5); *719* (29); *720* (28).
Schiede, C. J. W. *88* (11).
Schoenfeldt, L. *2915* (7).
Schott, A. — (33, 40).
von Schrenk, H. — (6, 15, 16, 31, 40, 48).
Schuchert, C. — (17).
Schuette, J. H. — (15, 19, 31).
Schulz, E. D. *255* (20); *475* (33); *679*, *701* (24); *766* (8); *767* (33); *845* (43a).
Scott, W. — (15).
Schumann, W. *1071* (43).
Seaton, H. E. *7* (7); *27* (5); *150* (43); *322* (29); *391* (43).
Seler, C. & E. — (27); *22* (28); *722* (10); *723* (36); *724* (13); *1174*, *1379* (43); *4194*, *4347* (13); *4560* (15).
Sesse, M. & Mocino, J. M. *99* (51).
Seymour, A. B. —, *48*, *49* (17); *50* (8).
Seymour, F. C. *511* (16); *601* (15); *1324* (16).
Seymour, A. B. & Earle, F. S. *118* (32).
Seymour, A. B. & Waite, — (31).
Shannon, W. C. *3638* (11).
Shear, C. L. *38* (40); *191* (19); *202* (16); *3577* (20).
Sheldon, E. P. — (31, 40); *26* (35); *38* (31); *48* (40); *49* (17); *8202*, *8856* (31); *11167* (16).
Sherff, E. E. — (19); *333* (35); *1649* (16); *1797* (31).
Shimek, B. — (8).
Short, C. W. — (17, 19, 35).
Shull, G. H. *156* (16).
Singer, J. W. *178* (17); *308* (15).
Sintenis, P. *1074*, *2010* (14).
Skehan, J. — (14, 32); *20* (27); *46* (8); *47* (40); *109* (8).
Small, J. K. — (6, 9, 15, 16, 17, 19, 31, 32); *2100*, *2124* (37); *4020* (14); *5707* (3); *8469* (38); *8509*, *8594*, *8599* (37); *8686*, *8732* (38).
Small, J. K. & Carter, J. J. *1072* (14); *1077*, *2994* (37).
Small, J. K., Carter, J. J. & Small, G. K. *3311* (37).
Small, J. K. & Heller, A. A. — (9); *432* (17); *484* (6).
Small, J. K. & Small, G. K. *4337*, *4341*, *4403*, *4520* (14); *5422* (37).
Small, J. K. & Wherry, E. T. *11774* (8); *11781* (40); *11813* (1); *11824* (33); *11826* (29a); *11834* (43a); *11901* (34); *11903* (33); *11968* (40); *11969*, *11980* (29a); *11998* (8); *12010* (33).
Small, J. K. & Wilson, P. *1961* (37).
Smith, C. L. *221* in part (43); *222* (5); *224* (11); *1474* (46); *1737* (11).
Smith, C. P. *3186* (17).
Smith, E. A. — (35).
Smith, E. C. — (41).
Smith, H. H. *5645* (19); *5654* (16); *5670*, *5923* (17); *5952*, *6028* (19).
Smith, J. D. — (17, 31, 32, 35).

Smith, J. G. — *464* (46).
Smith, L. C. *27* (7); *348* (45); *412* (29); *634* (11); *794* (5).
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Explanation of Plate

PLATE 13

(Drawn by Josephine Darlington. Magnification: figs. 1–3, × 5; figs. 9–19, × approx. 30)

Verbena macrodonta Perry

From the type specimen, *Nelson & Goldman 7425*, in the Missouri Botanical Garden Herbarium.

Fig. 1. Flower.

Fig. 2. Stamen.

Fig. 3. Pistil; (a) sterile style-lobe, (b) stigmatic lobe.

Fig. 4. Nutlet; (a) lateral, (b) commissural, (c) dorsal surfaces.

V. Wrightii Gray

Fig. 5. Flower.

Fig. 6. Stamen; (a) gland-like appendage.

Fig. 7. Pistil; (a) sterile style-lobe, (b) stigmatic lobe.

Fig. 8. Nutlet; (a) lateral, (b) commissural, (c) dorsal surfaces.

V. macrodonta and *V. Wrightii* are members of the sections *Verbenaca* and *Glandularia* respectively. Here are illustrated the contrasting characters of the inflorescence in respect to (1) the size of the flowers, (2) the staminal appendage, (3) the sterile and the stigmatic lobes in relation to each other and (4) the commissural surfaces of the nutlets.

Fig. 9. Diagrammatic longitudinal section of the flower of *V. canadensis*, showing the anatropous ovule with axile placentation.

Figs. 10–17. Diagrammatic transverse sections through the flower of *V. canadensis* to illustrate briefly the development of the carpels. Figs. 12–17 are of the ovary alone.

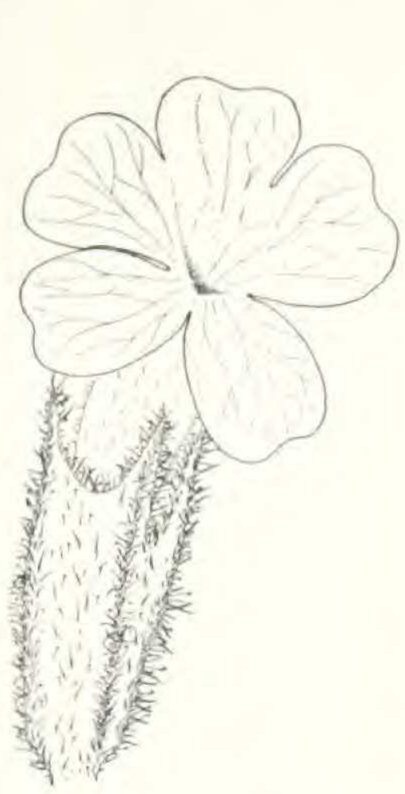
Fig. 10. Cross-section through the receptacle and the subtending bract after the central cylinder has broken up into (a) calycine, (b) corolline, (c) staminal and (d) carpellary traces.

Fig. 11. Showing the calyx and the corolla free from the ovary. In the latter, two breaks in the tissue have appeared. Probably these are the ontogenetic locules of a bicarpellary ovary.

Fig. 12. Showing the two locules united.

Figs. 13–17. Progressive steps in the development of the four ovules and their respective locules from the bicarpellary ovary. This is accomplished by the protrusion of the parietal placentae toward the centre bringing about axile placentation. Again the placentae appear to turn outward completing the development of the locules.

Figs. 18–19. Transverse sections of *V. bracteata*, demonstrating the subtrigonous form of the schizocarp in the section *Verbenaca* as contrasted with the subcylindric form of the schizocarp in the section *Glandularia*, cf. figs. 16 and 17.



1



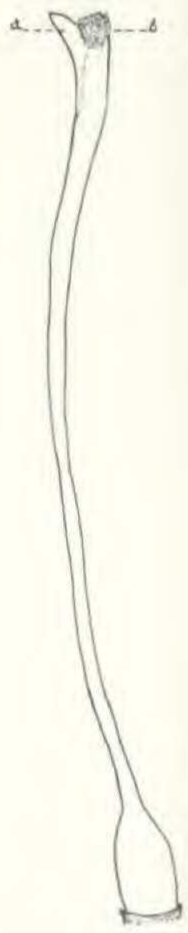
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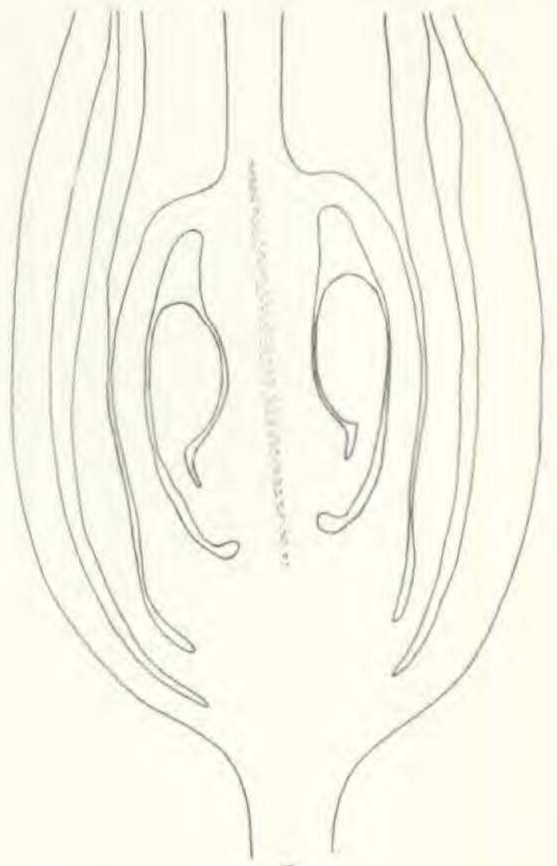
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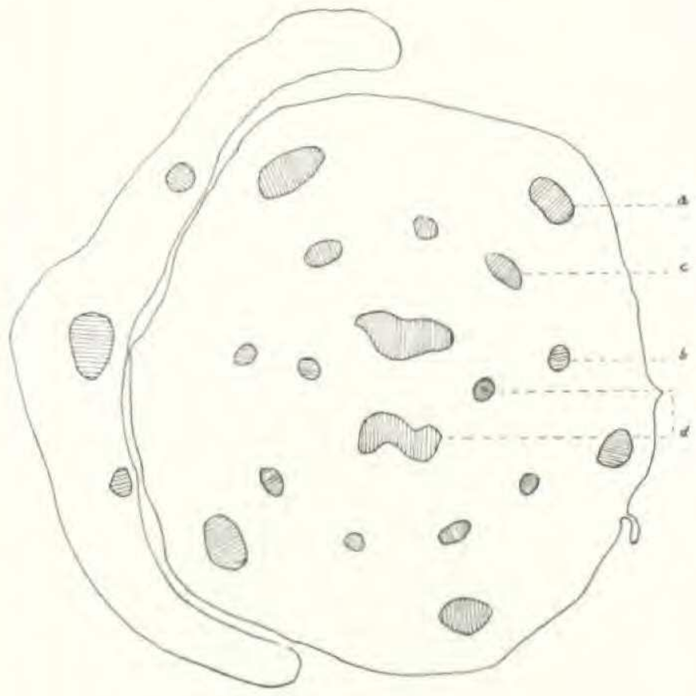
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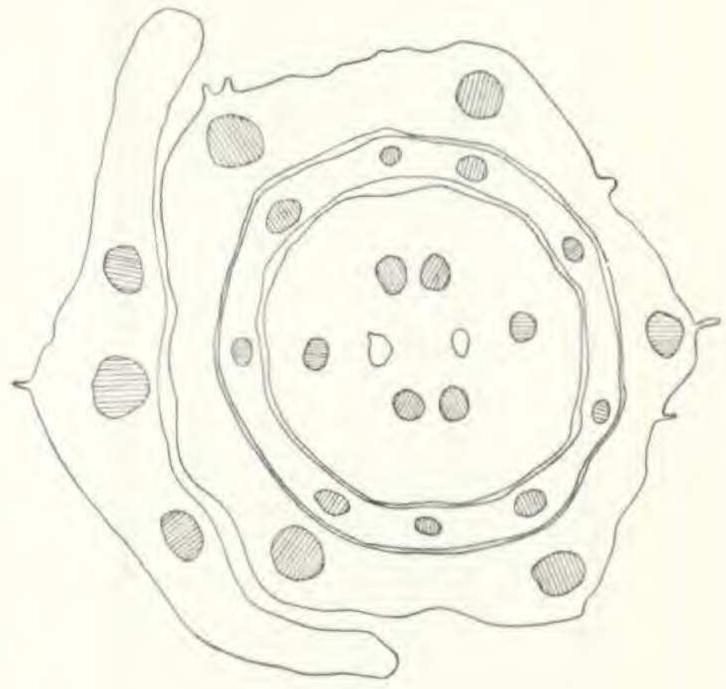


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8 c



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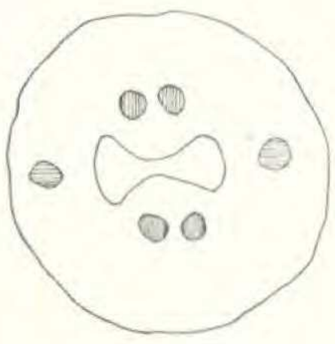
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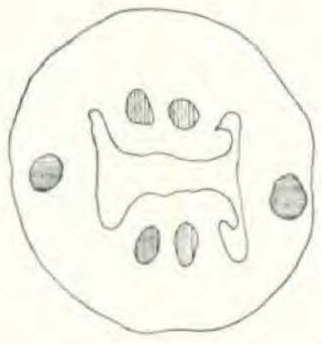
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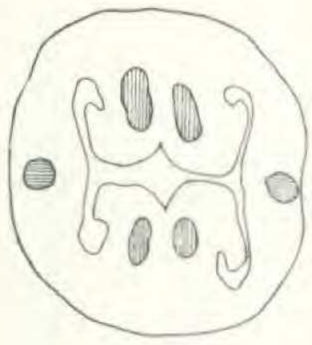
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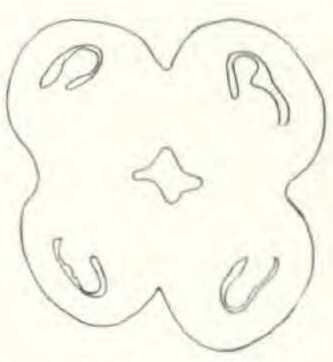
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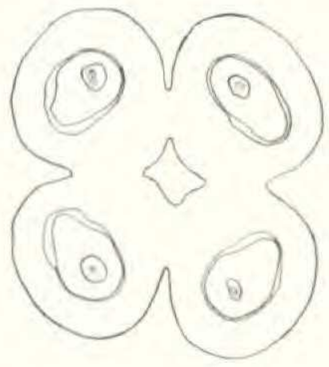
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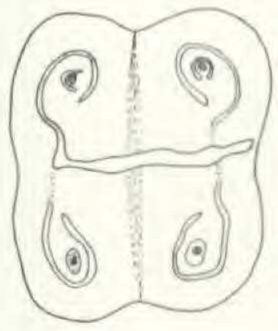
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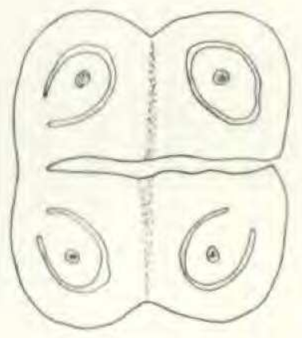
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17



18



19

EXPLANATION OF PLATE

PLATE 14

Verbena macrodonta Perry. From the type specimen, *Nelson & Goldman 7425*, in the Missouri Botanical Garden Herbarium.



Explanation of Plate

PLATE 15

Verbena setacea Perry. From the type specimen, *Purpus 195*, in the Herbarium of Pomona College.



PERRY—NORTH AMERICAN SPECIES OF VERBENA